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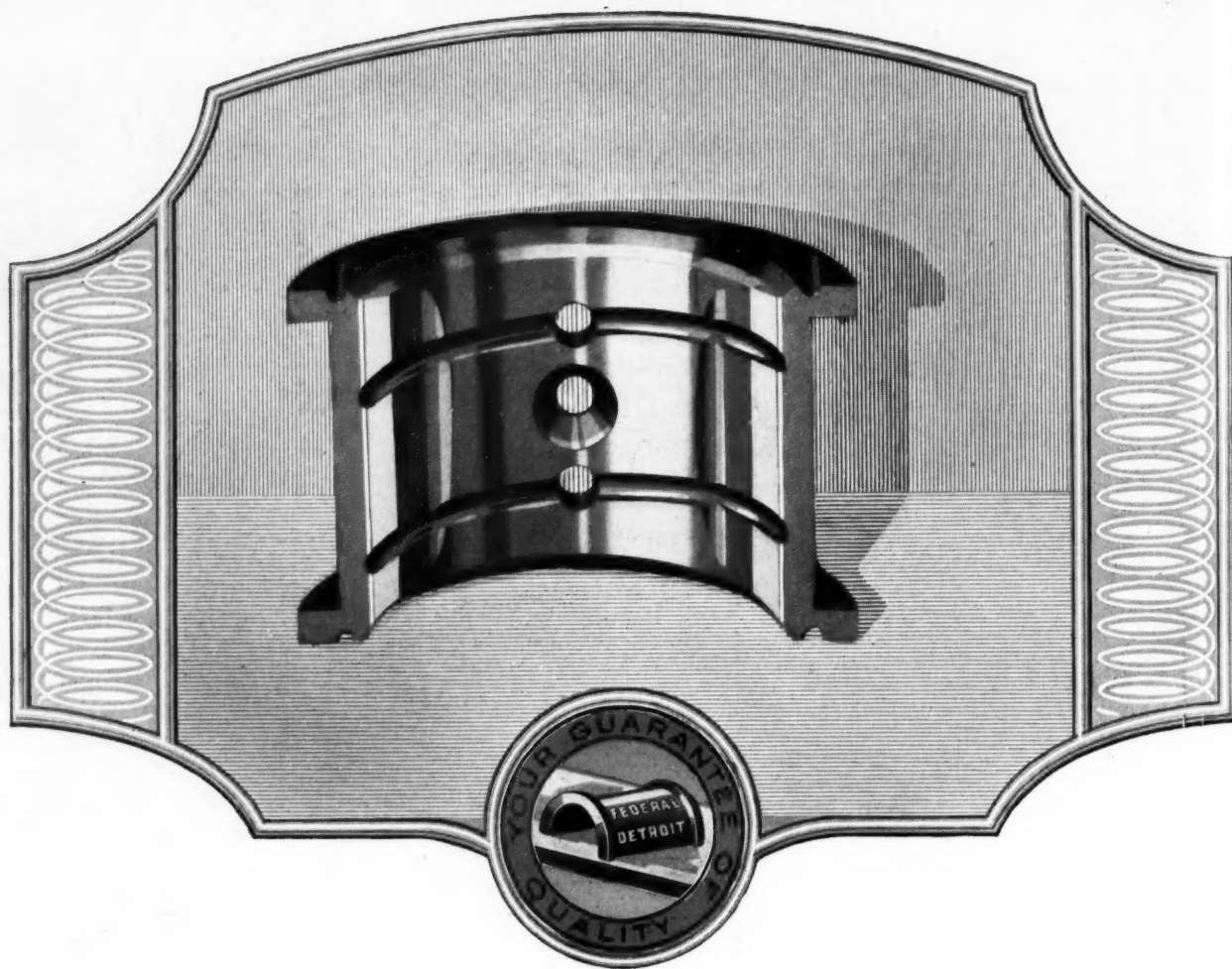
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No. 5

Coordination of Transportation Is Vital Economic Need

Business growth depends on its development. Motor vehicle has ushered in new era by supplementing existing facilities. History shows new modes of travel have always been fought by older forms. Fierce competition must give way to cooperation.

By James Dalton

TRADER is dependent upon transportation for its development. Business cannot grow if it lacks adequate facilities for the movement of goods. Neither can remain static. They must advance or retreat.

Until a decade ago it had been the history of the United States that those who provided transportation could make or break business. Then conditions changed suddenly. Established means of transport proved unequal to the burden imposed upon them by industry. But industry was no longer helpless and, for the first time, it was able to provide itself with a speedy, reliable means for the movement of a large volume of traffic.

Individual transportation had come into its own and highway transport had assumed real significance.

Rapid as was the expansion of railroads thirty or forty years ago, their development was in no sense as spectacular as that of the motor vehicle for the movement of freight and passengers. It had become an economic necessity because the other carriers had not kept pace with business. Excluding the bus and truck, transportation facilities had become entirely inadequate to the needs of the country. Many of those which were available were uneconomic and did not meet the needs of individual shippers.

While the motor vehicle never can take the place of the railroad or waterway, it has a very definite place in the field of transportation. The number of bus passengers and the tonnage of freight carried will increase year by year. Any attempt to prevent this progress will be wasted effort.

It has been the history of civilization that when existing forms of transportation became inadequate to the needs of commerce new forms were devised. The steam boat, the steam engine and the trolley car were developments of the nineteenth century, and the automobile arrived in the opening years of the twentieth century. Until its coming all forms of land transport, except that hauled by animals, had been designed to move persons or freight in the mass. They had to go when and where the train or trolley car went. Nothing was left to individual choice or convenience.

ALL this was changed, so far as short hauls were concerned, when the motor vehicle came into general use. It will be changed with respect to long hauls when aviation reaches a real commercial stage in the relatively near future. It is not conceivable that human beings will be content fifty years hence with the best transportation available today.

AGGREGATE business of the railroads of the country showed a remarkable increase in the first half of this year. It was due chiefly to more efficient service. Current earnings are running considerably ahead of normal and the

average by months thus far has been normal. Expenses and taxes have been kept down as gross earnings have gone up. The following table from the Annalist pictures what the carriers can do with reasonably efficient operation:

Revenue car loadings:	Period or Date	1923	Normal	Per Cent Departure from Normal
All commodities	Year to July 14	\$25,887,240	\$21,519,285	+ 20.3
All commodities	Week ending "	1,019,667	872,235	+ 16.9
Grain and grain products	" " "	40,415	46,382	- 12.9
Coal and coke	" " "	208,346	162,493	+ 28.2
Forest products	" " "	71,768	55,107	+ 30.2
Manufactured products	" " "	577,114	513,114	+ 12.5
Freight car shortage	2nd Qtr. July	84,210	199,845	- 57.9
Per cent of freight cars serviceable..	July 1	91.6	88.7	+ 3.3
Per cent of locomotives serviceable..	" "	82.0	76.9	+ 6.6
Gross revenues	May	547,282,485	441,946,956	+ 23.8
Expenses and taxes	"	457,282,845	423,119,405	+ 8.1
Rate of return on tentative valuation:				
Year to	June 1	5.69	5.75	- 1.0
Month of	May	6.33	5.75	+ 10.1

While the amazing industrial growth of the United States has been due chiefly to the expansion of its transportation facilities, the country always has suffered because of competition between these facilities rather than coordination of them. There was a heavy volume of traffic over inland waterways before they were paralleled by the railroads, but it was stifled to a large degree by the fair and unfair tactics of the steam carriers. They wanted all the business and they got most of it.

The coming of the traction line brought a readjustment of urban population. Then the interurban line, with its more frequent and convenient service, deprived the railroads of much of their short haul passenger traffic. The automobile, in turn, took a large share of this business away from the electric roads.

Early Troubles

The steam carriers fought those operated by electricity and there was many a merry battle before the State regulatory commissions which had the power to determine whether new traction companies were entitled to "certificates of public convenience and necessity."

In the earlier days the railroads had fought among themselves for business. The New York Central was laid along one side of the Hudson River, for example, and the West Shore along the other.

Big railroads gobbled up little ones to shut off competition. Then some of the railroads bought the electric lines which were taking business from them. They also acquired inland and coastwise steamship lines which were competing with them.

But a new era has dawned in transportation. Just as the last forty or fifty years marked a period of fierce competition the next forty or fifty will constitute a period of coordination and cooperation. The commerce of the country has determined that it will not continue to suffer because of jealousies and bickerings and misunderstandings and reaction.

That was the reason the Chamber of Commerce of the United States set up the Transportation Conference to study the transportation question minutely and determine how all the facilities available can be welded together to give the best service possible. It should be a matter of pride to the locomotive industry that its leaders have taken a broader stand than any others in relation to this vital problem. They know there is an

economic need for the motor vehicle, but they do not contend that it ever can supplant other means of transport.

To the credit of the railroads let it be said that they are giving better service today than they have in the past five years, and highway transport on a large scale has developed in five years. This better service has been largely a matter of necessity rather than choice, however. It has resulted from a quite natural desire to avert government ownership and operation.

Views Change Little

So far as their view of public relations are concerned the railroads have made little progress in the past quarter century. Most of them evince little more desire to please their patrons. Betterments in service up to this time have been made chiefly to meet competition. Until very recently they have not studied the needs and desires of their customers. It is comparatively unimportant but highly significant that years have elapsed since any change was made in the style of seat in chair cars and it is difficult to conceive how any more uncomfortable seats could be provided for a long journey. Railroad employees have not become more courteous, but rather more surly, as the years have passed.

Railroads bewail the animosity of the public toward them, but it is largely their own fault. They have not changed their point of view materially in twenty-five years. In short, they have not kept up with the times mentally any more than they have physically. Happily, some of them seem to be realizing this fact, and sooner or later it will percolate into the heads of all of them. When it does they will be eager to cooperate rather than compete. They will realize that they are the servants rather than the masters of the public and that those which please best will profit most.

No one in the automotive industry begrudges the carriers a fair return upon their investment or advocates government ownership provided private ownership proves its efficiency as it is doing today. This industry is prepared to do everything in its power to hasten the day of coordination if it can be arranged upon a reasonably fair basis. The problem must be attacked in a spirit of mutual accommodation, however, and motor vehicle interests must not be expected to make all the sacrifices. The Transportation Conference can accomplish tangible

results only if all the interests involved assume a give-and-take attitude.

The railroads must work with the operators of carriers on the waterways and highways rather than against them, actually as well as verbally, if we are to get anywhere. Some of them have proven that they want to do it and they are doing it. Substantial progress has been made in the past six months in promoting better feeling, although the problem is so huge it still seems discouraging. The spirit of conciliation and arbitration will roll up like a snowball once it gets fully under way, however.

Much of the animosity of the carriers toward the motor vehicle has been caused by lack of understanding and short-sightedness. They have held aloof and refused to get together for a frank exchange of views, but that situation is rapidly clearing up. Two prominent automotive executives have recently been elected directors of important railroads and they will be able to present facts as they exist rather than as they are imagined to be.

Transport Studies

The Transportation Conference is having expert studies made to determine the position to which trucks are entitled in the movement of freight in terminal areas, in short and long hauls, as well as the economic value of the bus for the carriage of passenger traffic. These surveys are being made along scientific lines and when they are completed they will provide incontrovertible basic facts upon which to proceed. Their accuracy cannot be assailed and they must be accepted by all concerned.

When these facts are established, if they demonstrate the need of radical reforms in the movement of freight, especially in relation to terminal facilities and congested districts, public opinion is expected to force the adoption of obvious recommendations for the improvement of service. A majority of the carriers concede that great

savings can be effected, with a consequent increase in earnings, if trucks are used almost exclusively for short hauls in terminal areas.

They also concede that trucks will go far toward solving the problem of inadequate terminals by making it possible to establish them outside congested districts where property values are almost prohibitive. If the surveys under way demonstrate the accuracy of these beliefs there will be little sympathy for the railroads if they do not effect the savings possible by putting them into effect. With that done solution of collateral problems will be relatively easy.

It is the contention of the automotive industry that the carriers should themselves operate trucks for store door collection and delivery in terminal areas and as a substitute for steam equipment on unprofitable short lines. Sooner or later the railroads are certain to go into the trucking business on a large scale, either individually or collectively. Many of the short lines will operate either rail cars or buses to carry passengers. It is equally inevitable that most traction lines will go into the bus business.

Railroads have suffered more than any other form of public utility from over-regulation. They have been the favorite targets of demagogues for a generation. Regulation originally was the result of their own sins or evil practices and it was wholly justifiable, but legislators got the habit and the carriers were regulated almost to death. The electric roads also have suffered to a considerable extent from hampering restrictions imposed both by States and municipalities.

It is quite natural, perhaps, that the carriers, steam and electric, should have wanted to make what they considered a common enemy suffer as they had suffered from political red tape and regulation of one kind and another. But the stubbornness with which they cling to outworn ideas is evidenced by the fact that they still are sponsoring and advocating stringent regulatory measures

Coordinated Effort Means Efficient Transportation



Modern standards of living and modern industry require efficient movement of persons and commodities. The motor truck, the railroad, and the steamboat must combine their forces to provide satisfactory transportation

when it has become apparent to almost everyone that in the comparatively near future they themselves will be operating large numbers of the motor vehicle common carriers they now want supervised so stringently.

When that time comes they are likely to find themselves hoist on their own petard. The Public Service Corp. of New Jersey, which operates most of the traction lines in that State, finding that it was losing much business to jitney and bus competition, fought them bitterly, seeking to regulate them off the streets. Now it has decided that a much more sensible course would be to go into the bus business itself, but it is doubtful if it will be able to obtain the necessary enabling legislation which there would have been no difficulty in getting a few years ago.

Railroads of both kinds are earnest advocates, in many cases, of legislation which would place motor vehicle common carriers under the jurisdiction of State public utility commissions. Several additional States enacted such measures at the last sessions of their legislatures. It is not to be doubted that the time is near when all States will have such laws. Statutes of this character, some mild and some stringent, already have been placed on the books in California, Connecticut, Delaware, Florida, Iowa, Maine, Michigan, Montana, New Jersey, New Mexico, New York, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Vermont, Virginia and Washington. The laws are new in ten of these States. The legislatures of Georgia and Alabama also are likely to act at sessions now in progress.

Government Regulation

The automotive industry doesn't object to having motor vehicle common carriers placed under the jurisdiction of State public service commissions. It is perfectly willing to concede that some form of regulation and taxation may be advisable. It will tend to stabilize the business in the hands of those operators best able to handle it at a profit. It will eliminate much of the cut-throat competition by inexperienced operators who have little knowledge of costs.

The industry does object, however, to having taxes on motor vehicle common carriers placed at such a high

IT is recorded that many travelers, especially those accustomed to riding in their own coaches and dining in state at inns along the way, did not like railroads. Samuel Breck, a New Englander, writing his recollections under date of Dec. 31, 1829, said:

"The modern fashion in all things is 'to go ahead,' push on, keep moving, and the faster the better—never mind comfort or security or pleasure. Dash away, annihilate space at a single jump, as it were, from town to town, whether you have pressing business or not. . . . After all, the old-fashioned way of five or six miles an hour, with one's own horses and carriage, with liberty to dine decently in a decent inn and be the master of one's movements, with the delight of seeing the country and getting along rationally, is the mode to which I cling and which will be adopted again by the generations of after times."

Breck had an urge toward individual transportation and he was a man of vision.

level that they will have to charge more than the railroads or trolley lines to operate at a profit. This is unfair. Advocates of rates so high they would tax the vehicles off the roads are likely to find them burdensome when they want to go into the business themselves.

Substantial proof of the broad-mindedness and far-sightedness of automotive interests is found in a paragraph of the final report of the Motor Vehicle Conference Committee on State regulation of common carriers, which reads:

"Legislation should be enacted enabling steam railroads, trolleys and shipping companies to acquire, own and operate the motor vehicle in conjunction with their regular line of business."

A Sane Report

Members of this committee were able to visualize the day when steam and electric carriers would be operating thousands of the vehicles they have condemned so bitterly and finding a substantial profit in this branch of their business.

Another paragraph in this same sane report says:

"As a prerequisite to the operation of a motor vehicle common carrier the owner should be obliged:

"a. To obtain a certificate of public convenience and necessity with a proviso that lines in actual operation before the law goes into effect shall, prima facie, be regarded as necessary to public convenience and necessity and should, therefore, automatically be granted a certificate.

"b. To take out liability insurance adequate to indemnify injuries to persons or damage to property resulting from negligent operation."

The fate of companies now in existence is one of the grave problems in relation to State regulation. A law which fails to recognize them may defeat its own purpose so far as freight carriers are concerned, because it will be perfectly simple for them to evade its provisions by becoming private rather than public carriers. Operators will have no difficulty in making contracts with the persons whose goods they already are moving. The same would not be true, however, of passenger vehicles.

It is likely to be found in the long run that the carriers will suffer more than anyone else from too stringent regulation of motor vehicles and too high tax rates.

Even the carriers themselves probably fail to realize that their opposition to motor vehicles and to the building of "subsidized" highways upon which they can operate, is an exact parallel to the opposition to the steam railroads in the earlier years of the nineteenth century. When it is considered how great a factor the railroad has been in the development of the United States it is difficult to comprehend that they came into general use in the face of the bitterest opposition.

Tradition Is Powerful

There always are people who believe that anything new is inferior. They have lived in the "good old days" and they reverence the "good old ways." It was so with the steam locomotive just as it was with the automobile. The chief opposition to the railroad came from those who had a vested interest in transportation facilities which the railroad was destined to supplant. For a generation the owners of canals and turnpikes opposed the construction of railroads. They were aided by other vested interests whose business was endangered by the progress of steam transportation.

It seems odd in these days of highway development that the tavern keepers along the turnpikes should have been bitterly opposed to the new means of locomotion.

State legislatures were exceedingly reluctant to grant charters and money with which to build lines was hard to find. There were many who contended that the turnpike afforded a faster and safer means of travel than the steam highway. It was held that the advantages of steam were too trifling to warrant the large expenditure necessary.

It did not take long, however, for the fast steam passenger train to prove its superiority to the stage coach, and wherever railroads were built parallel to turnpikes travelers adopted the new means of conveyance. Strangely enough, seventy or eighty years later the highways came into their own again and the railroads began to complain just as bitterly as the turnpike owners had done in their day because their tracks have been paralleled by automobile roads.

Canal-Railroad Controversy

The debate over the relative merits of railroads and canals as carriers of freight was not settled so easily and so quickly as the argument about the advantages of railroads and turnpikes. Railroad construction began in the United States just at the time that canal transportation had achieved a high degree of popularity. The Erie Canal, completed in 1825, proved to be a highway of immense value, and other States, stimulated to action by the success of the New York enterprise, began to execute extensive programs of canal construction.

In a number of cases railroads were projected to run parallel to canals and a controversy at once arose as to which of the two means of conveyance would have the advantage in competition for traffic. It was soon generally conceded that the railroad would be superior to the canal for the transportation of passengers, but the advocates of canal construction were far from admitting that the railroad would achieve any substantial measure of success as a carrier of freight.

On this subject, the *National Intelligencer* of Washington, an ardent defender of artificial waterways, said:

"We have with surprise seen it remarked lately in a highly respectable paper in Virginia, and repeated elsewhere, that the impression is becoming universal that railroads for the purpose of transportation will altogether supersede canals. We suppose the impression prevails to a considerable extent or we should not have found it in this form. In whatever form we have found it, or may hereafter find it, we cannot but consider it erroneous and fallacious."

The Federal government purchased a large block of stock in the Chesapeake & Ohio Canal Company and the legislatures of Maryland and Virginia also bore a share of the expense of constructing the canal. The Baltimore & Ohio Railroad was fortunate in being able to secure financial assistance from the City of Baltimore. Both companies were anxious to secure further appropriations of public funds.

In 1831 the Committee on Internal Improvements of the House of Delegates of the Maryland legislature requested the officials of the two companies to submit reports which would enlighten the committee as to the "relative expense, benefits and facilities of constructing railroads and canals, with a view to ascertaining to which of these means the funds of the State can be more beneficially applied."

Extensions Opposed

In the first annual report of the president and directors of the New York & Erie Railroad the following statement appears:

A REPORT submitted to the Maryland House of Delegates in 1831 included a letter from Josiah White, acting manager of the Lehigh Coal and Navigation Co., in which he said:

"Railroads are a great improvement over turnpikes; but, in my opinion, are vastly inferior (particularly as a public work and in a republican country) to canals, both as to convenience as well as to economy. A canal is accessible anywhere, a railroad nowhere (without interrupting the current of traffic) except by an arrangement for turning out; and the more turn-outs that are made, the greater the casualties. By canal every boatman may choose his own motion, within the maximum motion; by railroad every traveler must have the same motion, or be subject to turn-outs which, as I have said, have their casualties. The motion of twenty or thirty miles an hour on railroads will be fatal to wagons, road and loading, as well as to human life."

"No sooner, however, was the report of Judge Wright presented to the legislature, showing the feasibility of completing at moderate expense the desired channel of intercourse through the southern section of the State, than a combination of local interests, singularly violent in character, was arrayed to defeat the enterprise. The most active and determined exertions were made, openly by some and covertly by others, to prejudice the public mind and discourage, if possible, the friends of the undertaking. The object was denounced as chimerical, impracticable and useless.

"Anonymous writers were employed to pronounce the survey inaccurate and deceptive and the estimates unsafe and fallacious. The road, it was declared, could never be made, and if made could never be used. The southern counties were asserted to be mountainous, sterile and worthless, affording no products requiring a road to market, or if they did that they ought to resort to the valley of the Mohawk as their natural outlet. The whole enterprise, supported, as it was, by great masses of the population of the State, was pronounced to be a mere scheme of stock jobbing and stigmatized as an attempt to deceive the southern counties—defraud the public—and ruin the individuals who might embark in it."

Public Interest Wins

The *American Railroad Journal* frequently published long communications both from the friends of canals and from the supporters of railroads. But, as the Quaker engineer of the Baltimore & Ohio Railroad stated, it was "public opinion and public interest" which finally settled the question and not the closely reasoned statements of the opposing advocates.

While the advocates of canals and turnpikes appeared for a time to have an unbounded confidence in the superiority of these two agencies over the upstart railroad, there was no disposition on the part of the canal and turnpike owners to welcome a competitive struggle with the new improvement. They soon gave evidence of fear of the outcome of such a struggle by opposing vigorously the granting of railroad charters by State legislatures.

The turnpike companies, stage lines, wagoners and innkeepers were the first to feel the full effect of railroad

competition in the United States. They made a determined but, for the most part, ineffectual resistance. Col. A. K. McClure described the struggle in Pennsylvania:

"It is difficult for our people in this progressive age to understand the desperate resistance made by the people generally throughout the State to the introduction of railroads. When Pennsylvania at an early age had given liberal assistance to the construction of turnpikes, making continuous lines from Baltimore and Philadelphia to Pittsburgh, it was accepted that our commonwealth was in the very front of progress, and our turnpikes developed an immense industry in what was known as Conestoga wagons. Hundreds of six-horse teams, with immense covered wagons, were constantly on the highways, as they transported commerce and trade between the East and the West, and they created what formed

ONE statement made by a railroad advocate in 1831 was of particular significance:

"We see no cause to change our opinions, as then expressed, with regard to the relative merits of canals and railways. Public opinion and public interest will settle the question in due time, and we rest assured that, at the same time that it is the tribunal of the last resort, the decision will be just."

a very powerful political factor in opposing the introduction of railways in the 'wagon tavern.'"

In 1835 the Seneca Turnpike Company presented a memorial to the New York Legislature seeking relief from prospective ruin. This company had been chartered in 1800 and had built a turnpike from Utica to Canandaigua with branches from Chittenango through Salina to the east shore of Cayuga Lake. The cost of constructing the road had been \$162,000, and because of the heavy expense of upkeep during the early years, when traffic had been comparatively light, the profits of the company had been very small. The country along the road had been settled rapidly after the highway was built, however, and for a time the company was fairly prosperous. Then the Erie Canal had been constructed and it at once swept from the turnpike "all the teaming and almost all the public travel except that passing in stage coaches."

The opposition of canal interests to the introduction and development of steam railroad transportation was more vigorous than the opposition of turnpike interests. A canal usually represented a much larger investment than a turnpike and the incentive to keep competitors out of the field was, therefore, stronger. Then, too, canal interests were able to secure greater public support than turnpike owners. The leading artificial waterways were State enterprises and most of them were constructed with borrowed money. Should these waterways be unable, because of railroad competition, to earn enough to pay for their cost, the debts incurred for their construction would have to be met with taxes. The public at large, therefore, had a distinct pecuniary interest in maintaining the business of the canals.

New York Struggle Spectacular

It was in New York, however, where the most spectacular struggle between canal and railroad took place. The Erie Canal was the most successful of all the early artificial waterways. It gave New York the commercial

leadership of the nation; it was also a great financial success, the tolls collected being sufficient to meet operating expenses and reimburse the treasury for the original cost of construction.

In chartering the Utica & Schenectady Railroad Company the Legislature authorized it to "transport, take and carry passengers and their ordinary baggage," but it was forbidden to transport freight.

The charter of the Auburn & Syracuse road, granted in 1834, required the railroad company "to pay the commissioners of the canal fund the same tolls on all goods and other property transported, taken and carried on the said road or ways, except the ordinary baggage of passengers, as may, at the time of such transportation on the said railroad or ways, be required to be paid to the State and on the same kind and description of goods and other property transported, carried and conveyed on the Erie Canal."

The Syracuse & Utica Railroad Company, also chartered in 1836, was required during the season of canal navigation to pay to the commissioners of the canal fund "such tolls on all goods and other property transported . . . except the ordinary baggage of passengers, as the canal board shall deem proper, but not exceeding the rates of toll charged upon like property upon the said canal."

Legislative Policy Changed

In 1851 the legislature abandoned its policy of discriminating against the railroads and enacted a law abolishing all canal tolls which railroad corporations had previously been compelled to pay.

It is not difficult to trace the parallel between the opposition of turnpikes and canals to the railroads and the struggle made by the carriers in recent years to ward off the competition of motor trucks.

Railroads showed no hesitancy in paralleling both highways and waterways, which usually touched the most populous towns, for the obvious reason that it thus would be possible to get the greatest amount of business. Their outcry, therefore, because their modern lines are paralleled by hard surfaced highways is the more ludicrous. It is in equally poor taste to inveigh against these "subsidized roads," built with the taxpayers' money, because they were liberally subsidized with public money in the early days.

History is simply repeating itself in the twentieth century. The turnpike, which was the progenitor of the hard surfaced road of the present day, has turned the tables on its ancient enemy and the American people have reverted to individual transportation, although their vehicles are driven by internal combustion engines instead of being drawn by horses.

Theory of Finned Cooling Surfaces

THE problem of reducing the actual geometrical area of fin-cooled surface, which is, of course, not uniform in temperature, to equivalent "cooling" area at one definite temperature, namely, that prevailing on the cylinder wall at the base of the fin, is dealt with in Report No. 158 of the National Advisory Committee for Aeronautics. This reduction makes it possible to treat all of the cooling surface as if it were part of the cylinder wall and 100 per cent effective.

An expression for approximate fin effectiveness is developed, based upon simple mathematics and very convenient in form for engineering use. An examination is then made into the magnitude of the errors involved in using this expression without correction and a determination of the corrections needed for accurate work.

New Buick Fours and Sixes Equipped with Front Wheel Band Brakes

Longer wheelbase and radical changes in lines of radiator, hood, fenders and bodies are among important improvements. Six-cylinder engine has detachable head, $\frac{1}{4}$ in. longer stroke, larger valves, high pressure lubrication and stiffer crankshaft.

By J. Edward Schipper

FOUR-WHEEL brakes and larger bodies embodying radical changes in appearance are the outstanding characteristics of the Buick fours and sixes for 1924. The six-cylinder engine has been refined to such an extent that it is almost entirely new. Among other changes designed to give a higher output, longer life and greater accessibility, it now has a longer stroke, larger and better cooled valves, a detachable cylinder head, in which the valve cage construction used for years on Buick cars is abandoned, larger crankshaft, and other improvements.

The wheelbase on the six has been increased to 120 and 128 in. in place of 118 and 124 in. The added length has been put into the bodies with a marked increase in roominess. Both the fours and sixes are materially changed in appearance by the adoption of a new radiator contour with a double curve resulting in a bevel line which runs practically the entire length of the car. The engine and the chassis on the four have minor refinements, beside the front wheel brakes and the new front axle designed to accommodate them.

The brakes on both front and rear wheels are mechanically operated and are applied by pedal. They are equalized in pairs, that is, the pull to the rear brakes is equalized with the pull to the front brakes, but the right and left brakes on the front and rear are not equalized individually.

Application of the four-wheel brakes is through the pedal to the equalizer which transmits the pull to a cross shaft for the front wheel brakes and another cross shaft for the rear wheel brakes. From these two shafts pull rods extend forward outside the frame to short cables

which operate the front brakes, while the rear brakes are operated by the usual rods inside the frame. The foot brakes themselves are of the external contracting type which gives a wrapping action. The brake band assemblies are interchangeable on all four wheels and the brake anchor is so located as to give a three-quarter wrap when the car is running forward.

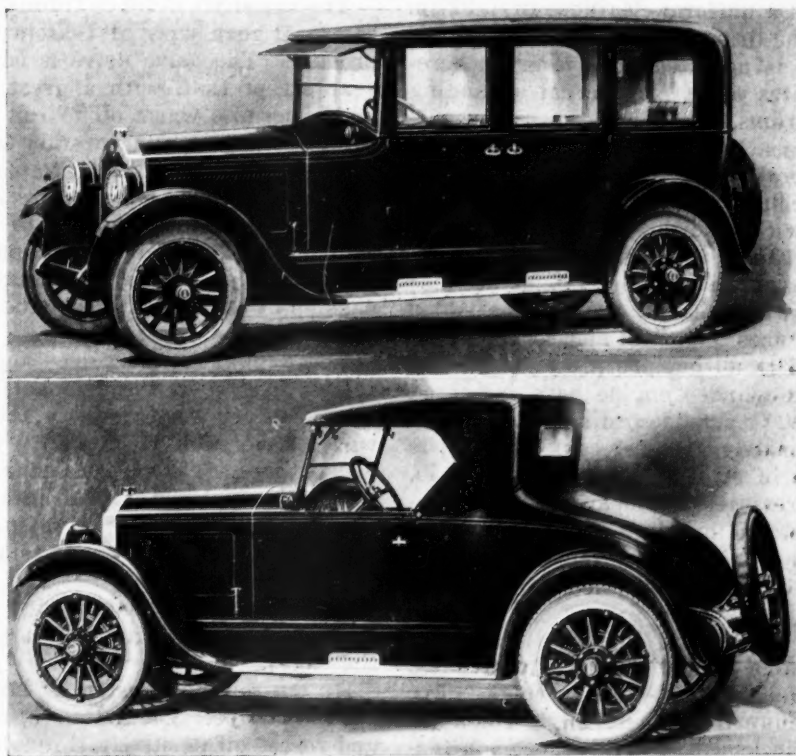
The brake operating linkage is such that the leverage

is greater on the rear brakes than on the front, the proportion being about 55 per cent for the rear brakes and 45 for the front. There is an adjustment, however, by means of which the relative leverage from the brake pedal to the front and rear brakes can be altered. The standard adjustment, which the factory has found gives the most satisfactory all-around use, is in the ratio mentioned. In case it should be desired, however, to change this relationship, the pull rod can be connected to other eyes in the equalizer bar.

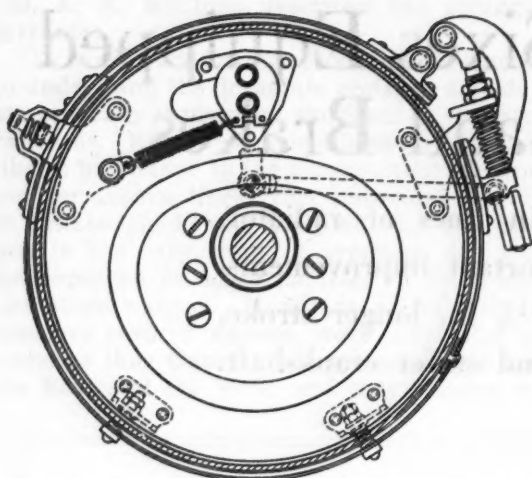
The front brake pull rods apply the brakes through levers on short shafts with slip joints at their inner ends and universal joints on their

outer ends. The brake toggles are operated by secondary levers at the outer ends of these short shafts and links connecting to the brake toggles.

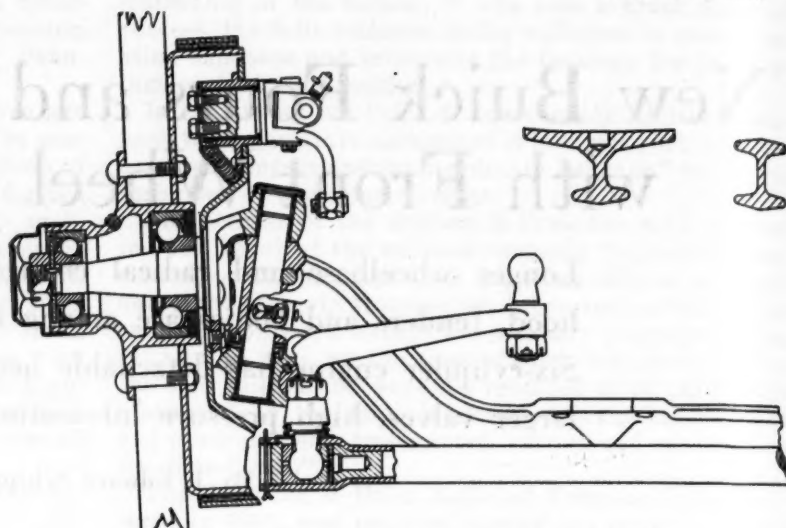
The vertical pin in the universal joint at the outer end of the front brake shaft has an axis which is perpendicular while the king pin about which the wheel turns in steering is so inclined that if produced it intersects the central point of contact between tire and ground. This lack of parallelism in the axis produces a relative movement when the wheel is turned and partially disengages the brake on the outside wheel in rounding a curve. This is



New Buick seven-passenger sedan (six-cylinder) and three-passenger roadster (four-cylinder)



Front wheel band brake



Front axle end showing details of brake

intended to prevent locking of the outside front wheel in turning a corner and to eliminate the tendency toward front wheel skid under these conditions.

The brakes are normally held out of engagement by coil springs. Adjustments for keeping the brake bands round and free from drag are provided. These adjustments are intended to give the band a uniform clearance of $1/32$ in. between the lining and the drum when the brakes are released. The hand brake is operated by a lever as heretofore. This lever actuates a set of internal expanding shoes against the rear drums.

The front axle has been entirely redesigned to take care of the front wheel brakes and the stresses set up by them. It is a reverse Elliott type. The section of the axle center is such as to withstand the torque due to brake reaction. The inclined pivot pins which are usually considered necessary in front wheel braking systems are also employed. The king pins are heavier to take the added stresses and the tie rod tubes have ball and socket joints at each end as required with all inclined pivot pins.

The changes in the six-cylinder engine have increased the output to 70 hp. at 2800 r.p.m., according to Buick engineers. This is approximately a 40 per cent gain and is due to a $1/4$ in. increase in stroke, larger valves, 77 lb. per sq. in. compression pressure as compared with 73, redesigned intake passages, an improved carbureting system and better lubrication. The bore remains $3\frac{3}{8}$ in. while the stroke is now $4\frac{3}{4}$ in.

Overhead Valve Systems

The overhead valve system is carried on the detachable head. The cylinders are hard semi-steel castings. The pistons are of similar design to those formerly employed but now measure $4\frac{1}{4}$ in. in length, $\frac{1}{2}$ in. longer than formerly. The connecting rods are $\frac{3}{4}$ in. longer. They are also stiffer in section and, in connection with the longer pistons, have materially reduced the side pressure on the cylinder walls. One of the objectives in the engine design in the new six has been to increase the life and the reduced side pressures. This, combined with harder metal for the castings, is for the purpose of retarding wear.

The crankshaft is $\frac{1}{4}$ in. larger in diameter and is carried on larger bearings than formerly. The crankshaft diameter is now $2\frac{3}{8}$ in. on the main bearings and $2\frac{1}{4}$ in. on the pins. The stiffer shaft is supported by a more rigid crankcase. The latter is deeper, partially due to the longer stroke, and is also more thoroughly ribbed. The main bearings are supported in the upper half of the case which is extended below the centerline of the bearing.

The case is recessed for the bearing caps so that the split in the main bearings is not in the same horizontal plane as the split in the crankcase. The camshaft is also larger in diameter and carried on larger bearings.

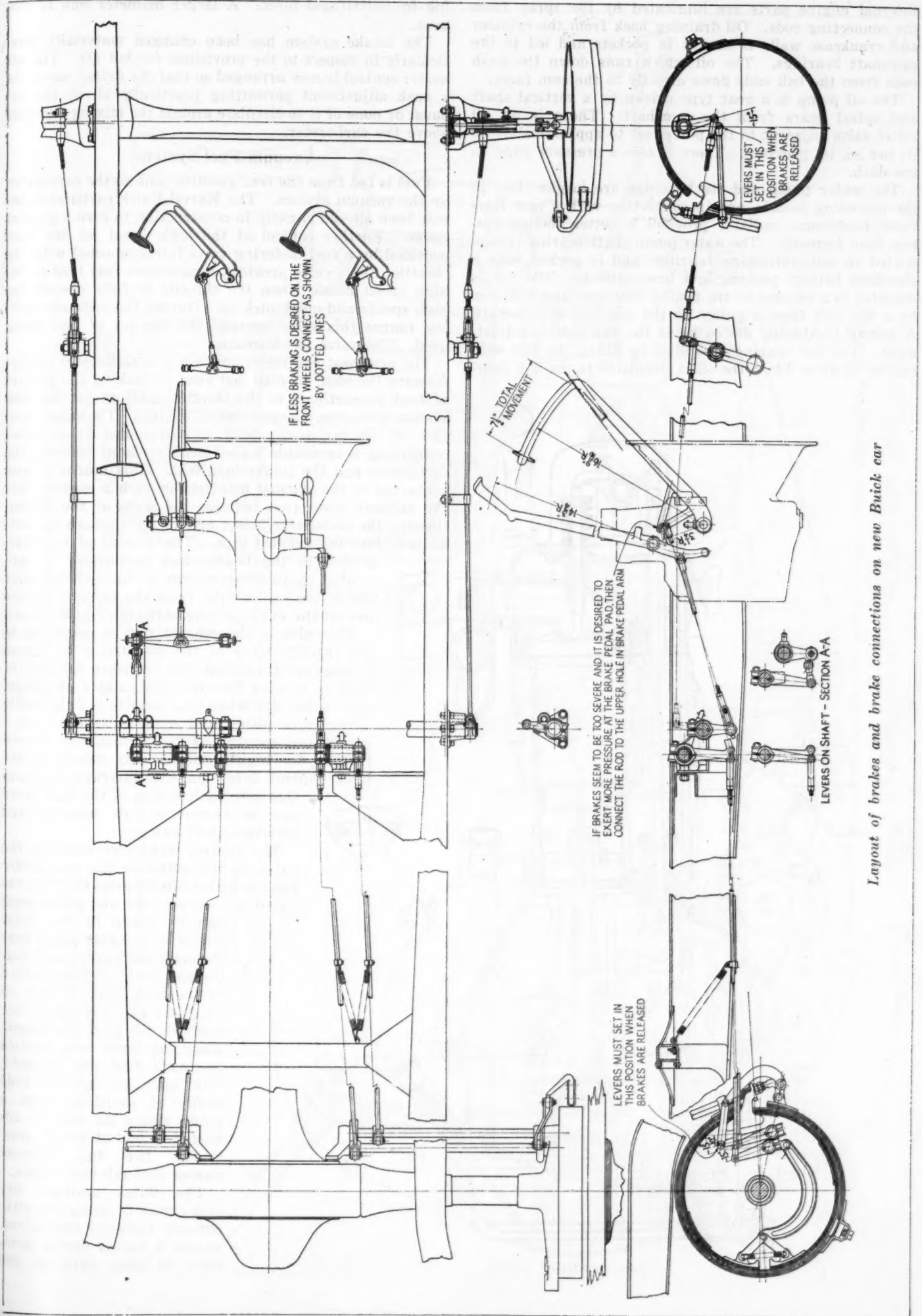
New Camshaft Gear Material

The camshaft drive is through helical timing gears, the camshaft gear being of Textolite, the new General Electric product. The valve drive is essentially the same as last year except that, with a greatly improved oiling system which permits warm oil to run down over the push rods, it has been found unnecessary to use a composition aluminum and steel pushrod to compensate for expansion. Since the pushrod temperature is now the same as engine temperature, the expansion is the same as that of the cylinder block and an all steel pushrod is used. Formerly, a part of the pushrod was aluminum to equalize the expansion of the rod with the other engine parts which were at a higher temperature.

The elimination of valve cages and the placing of the valves directly in the detachable head has permitted the use of larger valves. Both the intake and the exhaust valves have been increased in diameter $\frac{1}{4}$ in. The exhaust valves are now Silchrome instead of the high tungsten formerly employed. The intake valves are a nickel-chromium alloy. The valve springs are now double instead of single and are now retained by a cap and key instead of a horseshoe pin. The valve passages are larger and are completely surrounded by water, the changes in this respect also being due largely to the elimination of the cages.

An entirely new system of lubrication has been adopted for the engine. The system operates at a higher pressure and forces oil positively through the valve system instead of relying on mist from the crankcase. Oil from the reservoir in the lower half of the crankcase is drawn through a strainer into the gear pump which is located at the lowest point of the crankcase so that it is always primed. The pump forces the oil through distributing pipes to the four bearings of the crankshaft and through holes drilled in the crankshaft to the six connecting rod bearings.

A second supply line from the pump carries oil under pressure to the hollow rocker arm shaft from which it is distributed to the rocker arm bearings, ball ends of the rocker arms and the valve stems. From the front end of the rocker arm shaft another pipe carries oil to the timing gear case furnishing lubrication for the gears and also the front camshaft and water pump bearings. The other



Layout of brakes and brake connections on new Buick car

internal engine parts are lubricated by the spray from the connecting rods. Oil draining back from the cylinder and crankcase walls is caught in pockets and led to the camshaft bearings. The oil which runs down the push rods from the ball ends flows directly to the cam faces.

The oil pump is a gear type driven by a vertical shaft and spiral gears from the camshaft. There is an oil relief valve adjacent to the pump, set to approximately 30 lb. per sq. in. pressure. There is also a pressure gage on the dash.

The water pump and its bearings are larger than in the preceding models, and in connection with a new Harrison honeycomb radiator provides a better cooling system than formerly. The water pump shaft bearing is supported in self-lubricating bearings and is packed with a shredded babbitt packing and brass glands. The fan is mounted in a bracket on the timing gear case and is driven by a flat belt from a pulley on the end of the camshaft. A spring tightening device holds the fan belt in adjustment. The fan bearings are oiled by filling the hub with engine oil after which the oil is circulated to the hub bear-

ing by centrifugal force. A larger diameter hub is now used.

The intake system has been changed materially, particularly in respect to the provisions for hot air. The air heater control is now arranged so that the driver can make a dash adjustment permitting practically all of the exhaust or none of it to circulate around the mixing chamber above the carbureter.

Vacuum Fuel System

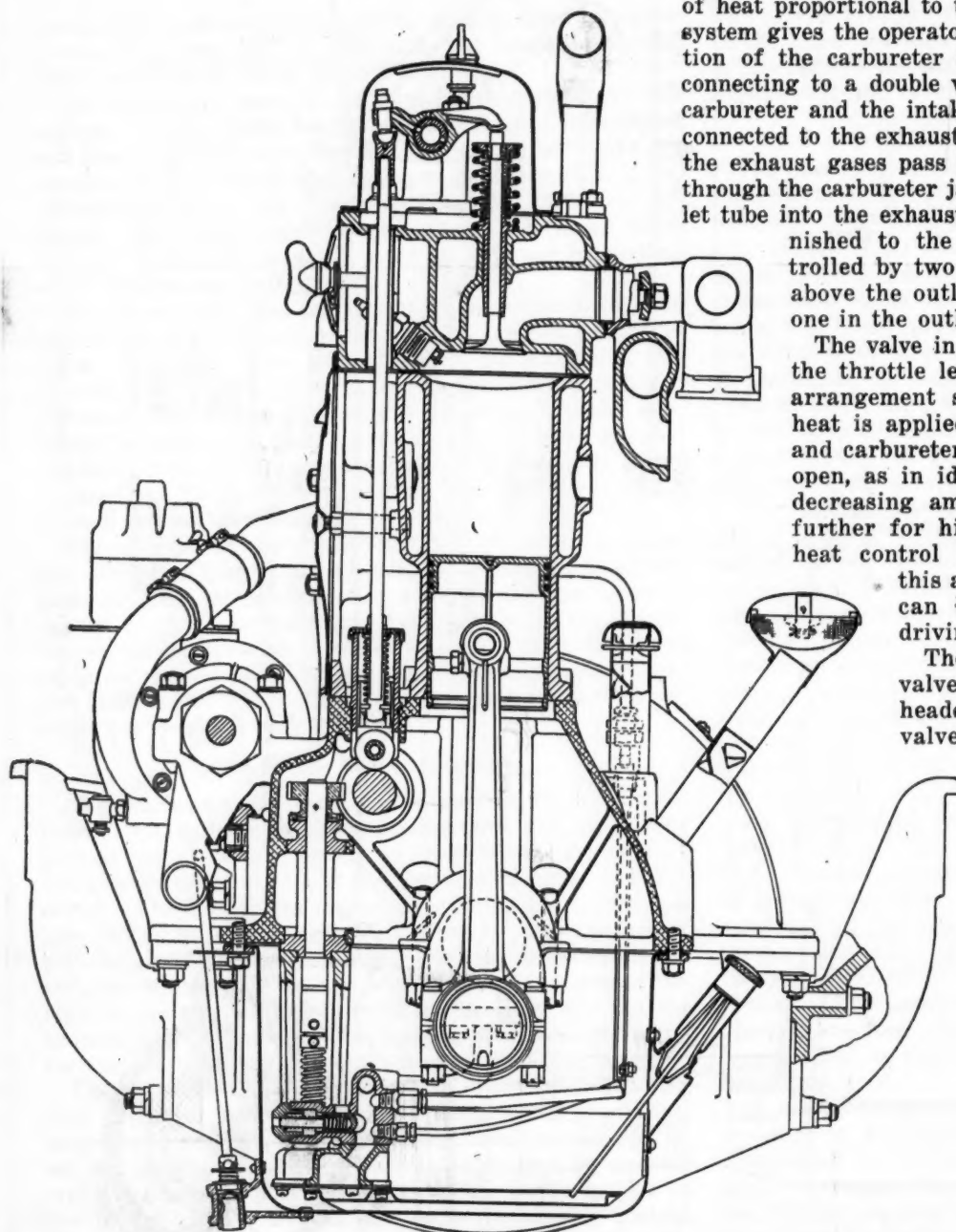
Fuel is fed from the rear gasoline tank to the carbureter by the vacuum system. The Marvel-Buick carbureter has now been altered slightly in construction to give a greater range. Further control of the high speed jet has been provided by a fuel metering valve interconnected with the throttle. This valve provides a maximum fuel feed to the high speed nozzle when the throttle is fully opened for high speeds and quick pick-up. During the ordinary driving ranges this valve controls the amount of fuel being used. The valve is automatic.

The new heat control system for the carbureter carries forward the idea, adopted last year, of making the amount of heat proportional to the throttle opening, but the new system gives the operator better control. The upper portion of the carbureter body is surrounded by a jacket connecting to a double walled header placed between the carbureter and the intake manifold. This header is also connected to the exhaust manifold in such a manner that the exhaust gases pass between the walls of the header, through the carbureter jacket and thence through the outlet tube into the exhaust pipe. The amount of heat furnished to the header and carbureter is controlled by two valves, one in the exhaust pipe above the outlet tube from the carbureter and one in the outlet of the carbureter heat jacket.

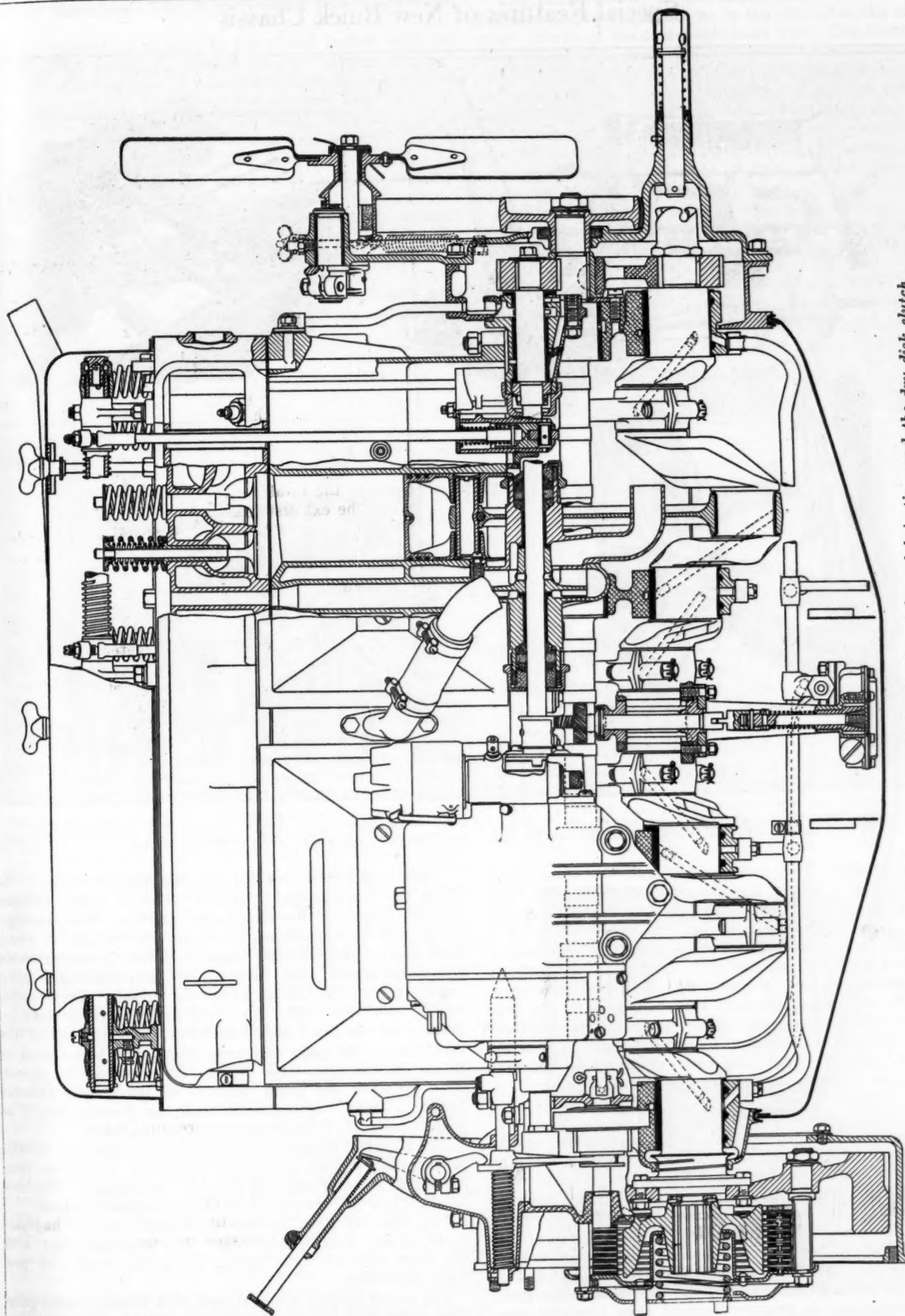
The valve in the exhaust pipe is connected to the throttle lever of the carbureter by a cam arrangement so that the greatest amount of heat is applied through the jackets of header and carbureter when the throttle is only partly open, as in idling and at slow speeds, and a decreasing amount as the throttle is opened further for higher speeds. By means of the heat control lever on the instrument board this automatic action of the heat valve can be varied to suit weather and driving conditions.

The control lever also operates the valve in the outlet of the carbureter header jacket simultaneously with the valve in exhaust pipe and adjustment can be made to the point where no exhaust gases pass through the header and carbureter jackets. The position of the heat control lever on the dash regulates the amount of fuel consumed, since the more heat applied the more fuel will be used. The operator has a wide range of positions from a point where no heat is admitted to one at which practically the full exhaust passes through the heater.

The Buick multiple dry disk clutch is continued without any material alterations, except a higher spring pressure to take care of the

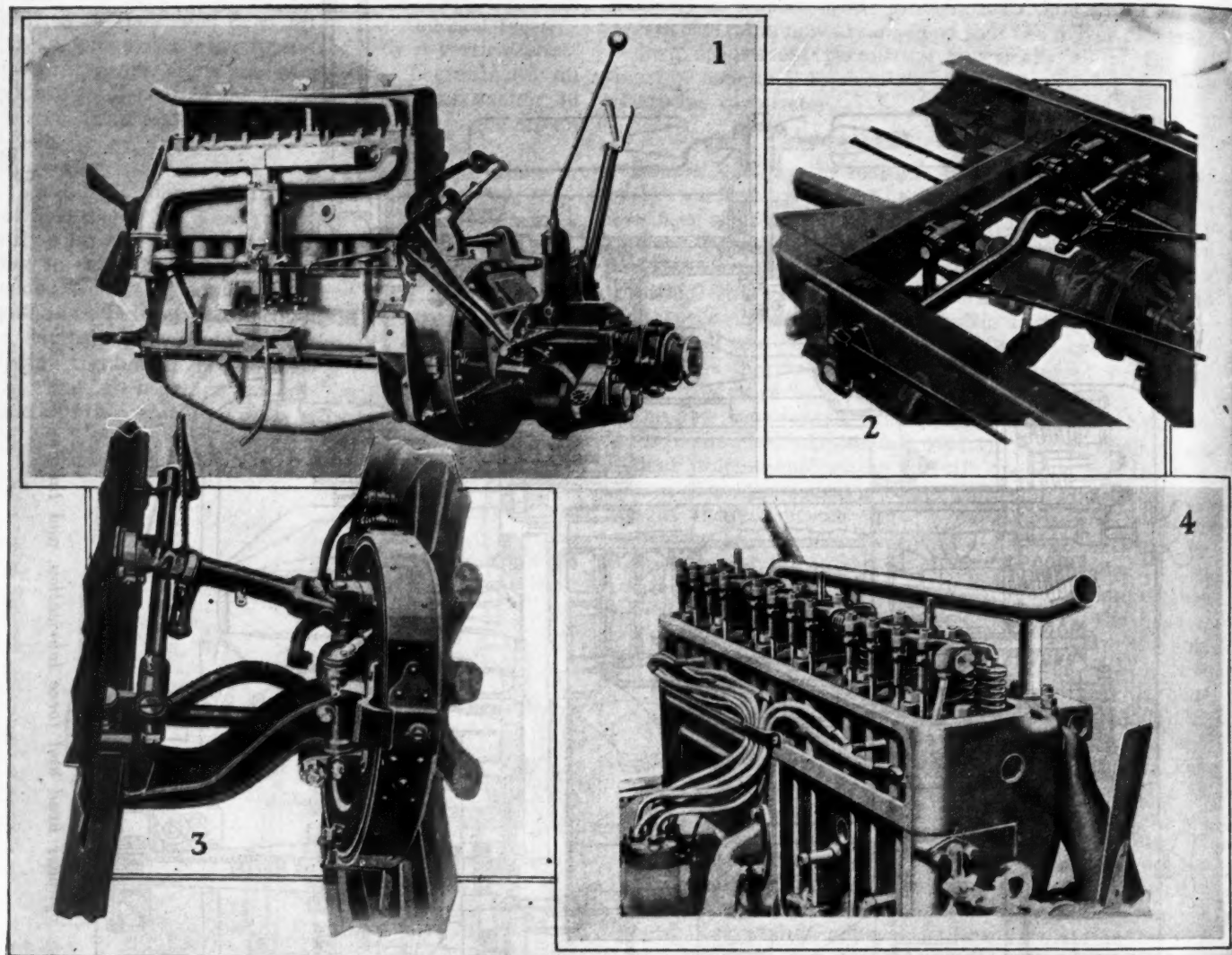


Cross section of engine



The new Buick engine with separate cylinder head and force lubrication, and the dry disk clutch

Special Features of New Buick Chassis



1—The unit powerplant. 2—Center of frame, showing arrangement of brake shafts and equalizers. 3—Front wheel brake control mechanism. 4—Top part of engine with covers removed

greater torque. The drive is through the three-speed gear box to a single large universal joint and fully inclosed propeller shaft. The propeller shaft is connected directly to the rear end of the gearset by a large ball joint inclosing the universal. The universal is lubricated from the gearset and there is a new baffle in the gearcase to properly guide the oil. Both the torque and drive are taken through this ball joint. The rear axle is a full-floating type. The rear axle third members and the springs are longer and heavier to take care of the longer wheelbase. There are now extensions on the rear spring axle seats for convenience in placing a jack.

Frame Strengthened

The frame of the six has been strengthened for rigidity by increasing the depth of the side members and the strength of the cross members. There is a tubular cross member at the rear and also a sheet steel cross member which not only covers the tank but also acts as a web to materially increase the rigidity at the rear end of the frame. The two center cross members are of box section and there is a tubular cross member at the front end of the frame. The engine carriers are now detachable arms on the crankcase, of greater strength than formerly, rendering the crankcase less liable to distortion.

There are ten bodies for the six-cylinder chassis. Of these the five-passenger "double service" sedan, two-passenger roadster, five-passenger phaeton, five-passenger sedan and four-passenger coupe are on the 120 in. wheelbase and seven-passenger phaeton, seven-passenger sedan, brougham-sedan and three- and four-passenger sport models are on the 128 in. wheelbase chassis. These bodies are all new this year. The lines are materially different because of the bevel edge and there are a number of new features in the body and trim which are being used by Buick for the first time in the 1924 models. In appearance the cars are lower because of the deeper crowned fenders, lower runningboards and the greater length as well as because of the streamlining of the body.

The steering wheel has no sector for spark and throttle control but employs short levers instead. The front compartment is materially improved in appearance. The new hood contour is carried out in the instrument frames.

The tops are new, having a different contour and patented gypsy quarter curtains. The curtains open with the doors and are held tightly to the body sides by new tight fasteners.

The closed models are equipped with heaters, dash gasoline gages and other conveniences. The new metal covered pillars on the closed models are narrower and thus

obstruct vision less. This is particularly true at the windshield.

Plush upholstery is used in the closed bodies with the exception of model 41, known as the "double service" sedan, in which a more serviceable upholstery is employed to increase the life of the car for ordinary use. This, in a way, is a business type of car, being designed from a utility standpoint although suitable for ordinary family use.

The brougham is a new type. The body, in common with the other Buick closed bodies, is a Fisher product. It is long and low with this effect accentuated by a trunk rack and two spare tires on the rear. It has six plate glass windows and rounded top which give it a distinctive appearance. It is upholstered in deep plush.

All of the cars have the new deeply molded fender contour with all frame ends, tank, etc., covered with sheet metal aprons.

The improvements in the four-cylinder car are not as far-reaching mechanically as in the six, since the engines were already of the detachable head type. The fours, however, being fitted with the four-wheel brakes, require the new reverse Elliott type of front axle especially designed to take braking torque. In order to accommodate the larger bodies, the frame has been strengthened with a new cross member and a stronger construction is employed in the front spring hanger and the front spring shackle bracket. The steering gear is new and now has a one-piece ball joint tire rod tube. Body equipment is more complete with improved side and rear curtains on the open bodies and, on the closed bodies, new type ventilating windshield, sun shades and cowl ventilator, and on the roadsters and coupe new door openers.

There are four bodies on the 109 in. wheelbase four-cylinder chassis. These are a four-passenger coupe, two-passenger roadster, five-passenger phaeton and sedan.

Reo Delivery Wagon Built on Taxicab Chassis

Designed for loads up to 1000 lbs. Folding Seat for driver's assistant is new feature. Panel type body used. Price \$1485.

A NEW light delivery wagon designed for fast service for loads averaging not greater than 1000 lb. is now in production by the Reo Motor Car Co. The new vehicle is based on the standard 113-in. wheelbase taxicab chassis. The wheels are the Tuarc disk type fitted with 33 by 4½-in. cord tires. The price is \$1,485 factory list.

This taxicab chassis, which was introduced by Reo in December, 1921, incorporates the same units as the speed wagon, but has a shorter wheelbase and a 20-ft. turning radius, making it suitable for city delivery work.

The new model will be known as the Parcel Delivery. The car is equipped with a panel type body. The lower panels are single pieces running the full length of the car from the rear doors to the driver's compartment. The upper portion of the body may be either panels or screen, the two units being interchangeable. The panels are laminated wood treated to prevent warping. The rear doors are paneled over the lower part and screened over the upper portion. A steel bar is used in locking the doors when they are closed.

Details of Body Design

Entrance to the driver's compartment is through doors reaching to the top of the cowl. In the compartment is mounted a seat of the bucket type for the driver and a second seat is provided for driver's assistant or passenger. This is a folding seat, dropping under the cowl when not in use. With the folding seat out of the way, room is provided for a package 8 ft. long and 30 in. wide. The length of the body behind the driver's seat is 71 in. and the width at the narrowest point is 44½ in. The height of the rear door opening is 47¾ in. The inside of the body is covered for its entire length and to the height of the doors by ribbed steel panels. The doors are covered for one-half of the height with steel panels forming pockets for the carrying of letters, slips, etc.

The top is of slatted construction with sound absorbing fabric. The top material is heavy canvas coated with water-proofing material. Drip moldings are provided to carry away water. The equipment includes an electric dome light installed in the top within convenient reach of the driver. This light illuminates the interior of the body permitting the driver to read the address on packages, etc. In addition there is a rear bumper, tire carrier on three supports fastened to the left side of the body, a heavy sheet metal tool box on the left running board, a standard taxicab type of windshield and side curtains.



Driver's compartment of Reo parcel delivery wagon

Just Among Ourselves

Public Soon Will Give Answer on 4-Wheel Brakes

UNUSUAL interest attends the announcement this week of the new Buick models because they include an unusually large number of important changes. Both the "four" and "six" will be equipped with four wheel brakes, thus bringing them in a price class under \$1,000. Buick, Packard and Rickenbacker now have definitely adopted four wheel brakes and it is reported Cadillac and Oakland will do so. It is probable other companies will follow suit. The Flint, the Durant car designed to compete with Buick, will not have them, and Studebaker has stated that they will not yet. It will be possible in the near future, therefore, to get some line on the public reaction to the new braking system.

French Watch Development of 4-Wheel Brakes Here

FRENCH automotive engineers are keenly interested in the adoption of four wheel brakes in this country. They have been experimenting for a long time with various systems and some of those devised have been abandoned as impractical. Some of the experts seem to feel that American engineers are in danger of going ahead along lines which European experience has proved entirely wrong. French developments in this direction go back at least fifteen years and they undoubtedly have much information which would

be of value. AUTOMOTIVE INDUSTRIES hopes to present some of it in the near future. Returns from a recent invitation sent to American engineers to discuss the four wheel brake question make it evident that a lot of them are pretty uncertain of their ground and don't care to go on record until they know more about the subject.

Some of Babson's Bromides Make Wall Street Worry

SOMETHING of a flurry has been caused in "financial circles" by a pronouncement issued by Roger Babson in reference to the automotive industry. Flurries are not unusual in these circles but it is astonishing that one should be caused even there by the bromides contained in Babson's "warning." After pointing out that production is 70 per cent ahead of last year he said that "statistics clearly indicate that the buying of automobiles has been increasing much faster than the buying power of the nation has increased and a turn is inevitable even if only temporary." It sounds all right but it doesn't mean anything. If purchasing power hadn't kept pace with the production of automobiles, the cars wouldn't have been made. Then he makes the sapient statement that "a period of most intense competition is ahead" and that "this is no time to carry heavy inventories either of cars or materials." The facts he uses have been known to the industry for months and his only deduction is all wrong, so why get excited?

Willys Wins from Bankers and Takes Home Bacon

JOHN WILLYS has taken the bacon back to Toledo again. He and his associates in his home city will remain in complete control of the Willys-Overland Co., which he put on the map and which the force of his own personality saved only three years ago from financial disaster. The complete story of Willys' break with the bankers who sought to dominate Willys-Overland as they had the Willys Corp. never has been told, but it took courage to force it. When he took the bull by the horns and threw the Willys Corp. into a receivership, knowing the assets would be ample to pay all claims and leave something for the stockholders, the bankers were furious and they vowed to get even. They haven't yet and it doesn't look as though they would, for the company is going strong. When the Willys Corp. blew up it was characteristic of the man whose name it bore that he took his losses, running well into seven figures, with a grin. The whole industry is glad he is firmly seated in the saddle.

11 Per Cent of First Half's Output Went to Truck Men

THE curves of truck production in the first six months of 1923 and 1922 as compared with passenger car output in those periods were almost identical. The percentage this year was 11 and last year it was 10.77. Whether it has been stabilized at that figure remains to be seen, but it probably has not. The chances are that it will swing higher slowly in the future.

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

Passenger car production in the first half of 1923 was 1,828,965 and truck output was 197,000. In the first half of 1922 the figures were: Passenger cars, 1,036,497; trucks, 114,486. This shows a gain of 76.4 in passenger car output this year and 72 per cent in trucks. It had been expected that the rapid expansion of general business would demand the manufacture of a somewhat larger percentage of trucks, but all truck sales probably are not accounted for in current production figures for the first half because some companies have sold a good many they had on hand at the beginning of the year.

Industry Should Promote Highway Traffic Safety

WHEN the Olds Motor Works decided to place all its facilities at the disposal of officials who desire the cooperation of factory experts in solving traffic problems it undertook a real service to the industry. Manufacturers cannot afford to hold aloof from active participation in efforts to lower the accident hazard. It means more to them and to their dealers than to anyone else. Dangers of the road are keeping a good many persons from driving cars, but a more serious phase of the situation is that drastic regulations and penalties which it is proposed to impose in an effort to reduce accidents will drive many more of them off. Highway safety, less traffic congestion and increased parking space in cities are subjects in which every man in the industry as well as every motorist should take a personal interest.

Cooling Heels in Anteroom Often Makes Visitors Peevish

WHEN a man goes to a factory on a perfectly legitimate mission and is kept cooling his heels in an anteroom for an indeterminate period while he knows persons who arrived after he did, perhaps personal friends of the official he wants to see, are being taken in ahead of him, he is quite likely to get peevish. He won't wait if he can help it and he won't go again if he can avoid it. This is one of the best methods known for creating ill-will. It isn't always possible to follow the "first come, first served" plan, but it should be adhered to so far as possible, unless visitors have appointments for a definite time. When such appointments are made they should be kept. It also is rather irritating always to be told the man you want to see is "in conference" when you know he isn't. A definite statement as to how long a visitor will be kept waiting is the best policy provided the time set is reasonably accurate. Then, if the visitor can't spare the time to wait, he'll go away and try it again without getting sore.

One Company Has Plan to Defeat "Pirate" Parts

MEANS to encourage the use of genuine rather than "pirate" replacement parts have been sought earnestly and almost prayerfully by manufacturers. The trouble has been that "pirate" parts usually have been a good deal cheaper and often have given reasonably good service. Not infrequently

they have been available when others have not. There may be a good deal of merit, therefore, in the plan hit upon by the Brown-Lipe Gear Co. to market replacement parts for trucks, in handy packages, direct to fleet owners. They will be priced to meet the competition of replacement parts not authorized by the company and the marketing system devised will be such that they will be always obtainable on short notice. The service given will be profitable to the company, it will give fleet owners better service and it will benefit all the truck manufacturers using Brown-Lipe units in their products.

Railroad Shortsightedness Kills Another Branch Line

PERMISSION to abandon permanently a branch line in Franklin County, Mass., running from South Deerfield to Shelburne Junction, a distance of 6.74 miles, has been given the New Haven Railroad by the Interstate Commerce Commission. It was put out of business in 1918 by motor vehicle competition. The freight carried in that year totaled 378 tons and the revenue from passenger traffic was \$5.74. If the New Haven had been willing to accept the inevitable and had substituted motorized equipment for its steam line rolling stock it might have made a profit. This isn't the first short line which has met this fate and every failure of this kind should be a sermon pointing the way to others suffering from malnutrition.

J. D.

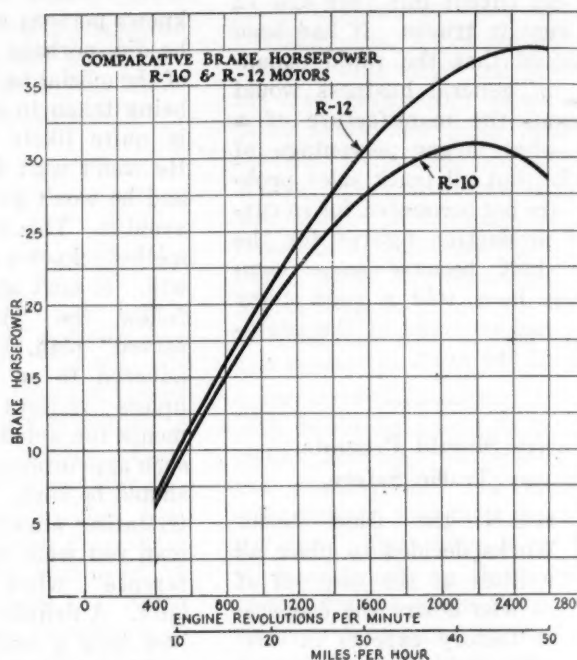
Mechanical Refinements and Improved Bodies Feature New Hupmobile

Higher power output obtained by use of forged duralumin connecting rods and aluminum alloy pistons. Clutch and gearset assembly changed. Wheelbase lengthened 3 in. Length of front and rear springs increased. Open model prices advanced \$50.

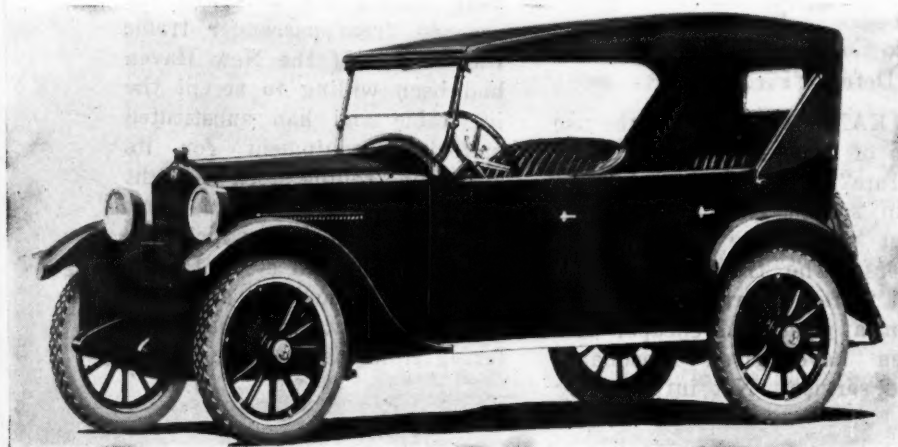
A NUMBER of mechanical and body changes are incorporated in the new Hupmobile models. The engine has been refined to increase its smoothness and power output, and the car has been improved in appearance and riding qualities by a 3-in. increase in its wheelbase and the provision of an easier spring suspension. The wheelbase is now 115 in. and the increase of 3 in. in its length has been accomplished by moving the front axle 2 in. forward, relative to the front of the radiator, and lengthening the body by 1 in. The bodies are entirely new, and while retaining the Hupp characteristics, they differ considerably in appearance from the former designs. There are seven bodies in the line, the prices ranging from \$1,215 to \$1,750. This represents an increase of \$50 on open models only.

Although the bore and stroke of the engine remain the same, $3\frac{1}{4}$ by $5\frac{1}{2}$ in., the output has been considerably increased by the use of forged duralumin connecting rods and aluminum alloy pistons. These have materially reduced the vibration and have had a noteworthy effect on the output at higher speeds. The combined weight of the new rod and piston is 3 lb., as compared with 4 lb. 2 oz. for the iron pistons and steel rods formerly used. At the same time there has been an increase of 13 per cent in the rod bearing area. A drawing of the new piston appeared in the June 26 issue of AUTOMOTIVE INDUSTRIES, page 1383.

The crankshaft has also been made considerably heavier, its present weight being 57.5 lb. as compared with 32.5 lb. in the previous engine. This increase in weight has been accompanied by an 18 per cent increase in main bearing



Horse power curves of the old (R-10) and the new (R-12) Hupp engines. These curves, we are informed, show the average full throttle output of stock engines

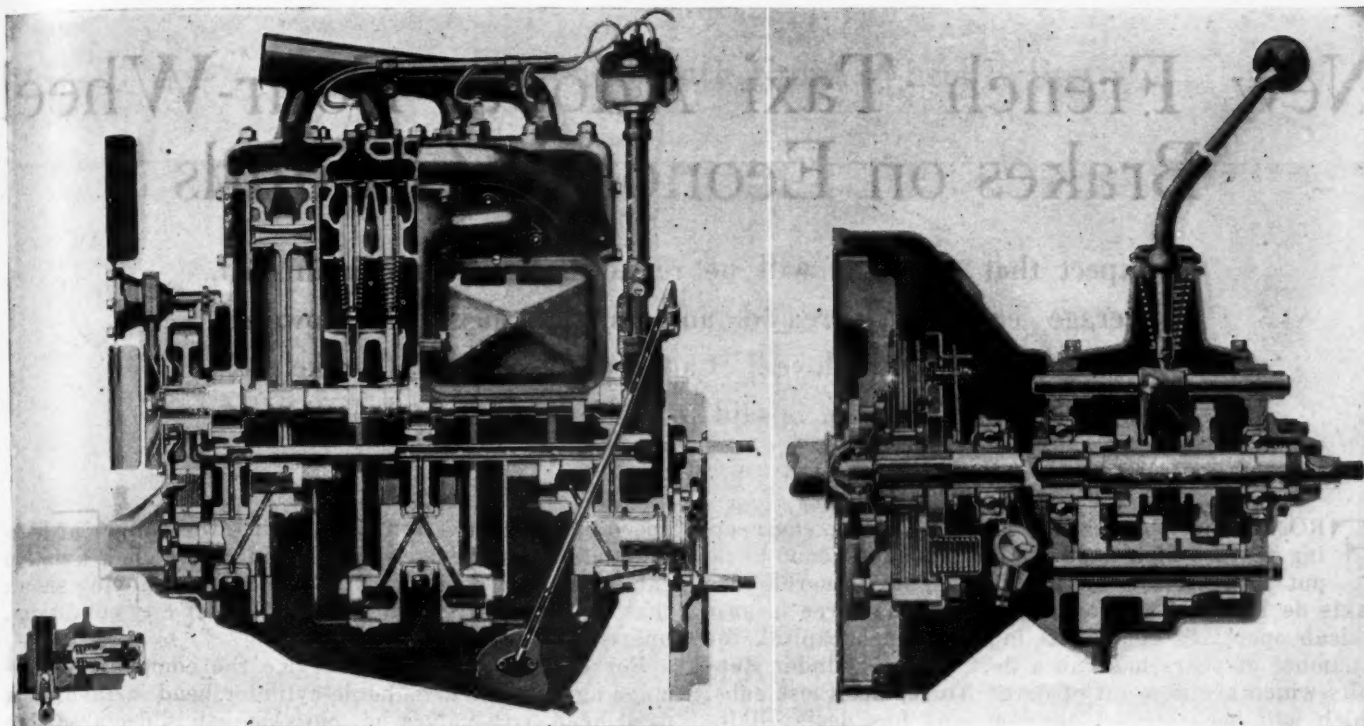


New Hupp phaeton which has a 3-in. longer wheelbase and embodies many improvements over the previous model

area. The crankshaft is also of somewhat different form, in that the long crank arms are at right angles to the crankshaft, instead of being inclined and slightly curved. The reason for this change is that the centrifugal action tends to deform a curved, inclined crank arm, and it has been found that less distortion occurs with straight, right-angled arms. The crank arms are provided with balance weights.

The camshaft is now $1\frac{3}{8}$ in. in diameter between cams, instead of $1\frac{3}{16}$ in., with a resulting increase of 55 per cent in stiffness, and the projected camshaft bearing area is increased 22 per cent.

It has been possible to increase the compression pressure from 65 to 80 lbs. per sq. in. absolute at 1200 r.p.m. This increase in compression has been rendered possible by the superior heat dissipating qualities of the new pis-



(Left) Sectional view of the Hupp engine. (Right) Sectional view of clutch and gearset assembly. This is interchangeable with the same assembly on the previous model but comprises a Long clutch

tons, an improved water circulating system, as well as by the lightness of the new reciprocating parts.

Bearings of larger capacity have been adopted all through the engine. In addition to the increase of crankshaft and camshaft bearing dimensions already referred to, the valve guides are now $3\frac{11}{16}$ in. long instead of 2 in. The water circulation has also been increased. The radiator hose connection has been enlarged from $2\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter. The water passages in the block and head are larger and there are now four outlets into the water header instead of two. The cylinder head studs have been increased from 16 to 18. Even with these increases, the powerplant weight for the entire engine, clutch and gearset assembly has been increased only 5 lb., to 603 lb. This small increase in weight is due to the fact that while the dimensions of a great many parts have been increased, the use of aluminum alloy for the pistons, connecting rods, front end chain case cover and the gearset housing has practically offset the increased dimensions.

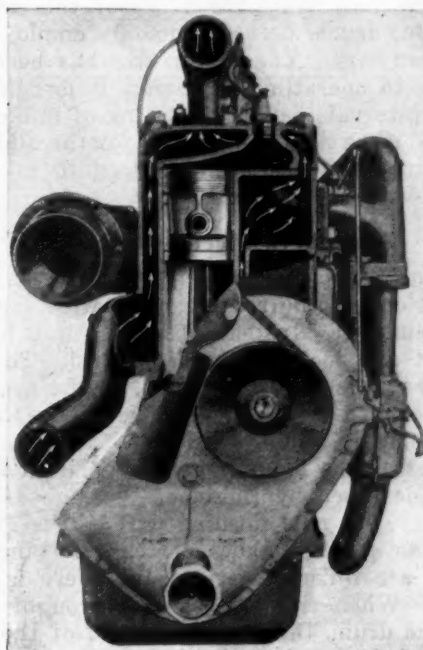
While there are several changes in the clutch and gearset assembly, the new assembly is interchangeable with the old. The cars are now equipped with a Long two-plate clutch in place of the type previously used, and the gearset design has been altered in a number of particulars. The bearing at the front end of the sliding gearshaft, which was formerly a plain bearing, is now a Hyatt roller. The clutch gear bearing, which was formerly a No. 208 Gurney, is now a No. 210, and all shafts are now made of $3\frac{1}{2}$ per cent nickel steel. The drive is through two joints equipped with a spring and sleeve centering device at each end of the shaft. The rear axle remains unchanged.

The rear springs, which were formerly $51\frac{1}{2}$ by 2 in., are now $56\frac{1}{2}$ by 2 in. The front springs have been increased from 36 by $1\frac{3}{4}$ in. to $37\frac{3}{8}$ by 2 in. The depth of the frame side rails has been increased from $4\frac{1}{2}$ to 6 in.

The appearance of the body has been improved by a number of modifications. The radiator has been raised $2\frac{1}{2}$ in. and is slightly narrower. The body sides are higher. On the open models the curtains are now stored back of the front seat and are mounted on permanent

frames so that the lights cannot crack. A new tire carrier is provided at the rear, mounted on a rear tubular cross member. The back of the front seat is now higher, the fenders are more fully crowned and the equipment has been added to. A new type of robe rail and a rubber mat in the front compartment are provided. The prices follow:

	Old	New
Five-passenger touring car	\$1,165	\$1,215
Special touring car	1,265	1,315
Two-passenger roadster	1,165	1,215
Special roadster	1,265	1,315
Two-passenger coupe	1,445	1,445
Four-passenger coupe	1,595	1,595
Five-passenger sedan	1,750	1,750



Water passages in Hupp engine, which have been materially enlarged

New French Taxi Adopts Four-Wheel Brakes on Economic Grounds

Expect that accidents will be reduced, tire wear diminished, average earnings increased and maintenance costs lowered. Servo mechanism employed. Cables used in place of brake rods. Cab weighing 3140 lb. is said to make 37 m.p.g. on long runs.

By W. F. Bradley

FRONT wheel brakes are the outstanding engineering feature of a fleet of 2500 taxicabs about to be put into service by the Compagnie Generale des Taxis de Paris. This concern, one of the three largest taxicab operating companies in the French capital, for a number of years has run a fleet of two-cylinder Renaults which are now out of date. To replace these cabs, which will be scrapped, the company has designed its own vehicles, and has decided that economy can be secured by the use of brakes on all four wheels.

The choice in itself indicates that the engineers have no doubts about the technical value of front wheel brakes, but the decision to make use of them has been arrived at on economic grounds. With no brakes on the propeller shaft and a brake on each wheel it is estimated that accidents will be reduced, tire wear will be diminished, average earnings will increase and maintenance costs will be lowered.

The first series of 500 cabs will go into service this year, the remaining 2000 coming out next year. The brake system adopted is the Perrot, with all drums 13.7 in. in diameter and 2 in. wide. The four brakes are applied simultaneously, by pedal, there being an equalizer between the front and rear seats, but none between the two brakes forming a pair. The braking surface is much greater than usual for a car of this weight and speed, 13.7-in. drums being commonly employed on 20-hp. passenger cars. The larger size has been adopted with a view to operating economy. It is believed that the greater intervals between relining of brakes and adjustment will more than compensate for the higher initial cost. The leverage has been reduced to avoid giving drivers an excessive braking power.

Semi-Servo Mechanism Used

Adjustment, as is common with the Perrot system, is at the front end of the rod engaging with the lever on the brake camshaft. Instead of a wing nut, however, a hexagon nut and lock nut are employed. The lever is mounted on a cone with serrations, in the same way as a detachable wire wheel and can be set to the desired angle by slackening off a single nut.

The brakes on the front wheels comprise a semi-servo mechanism designed by Engineer Waseige of the Farman Company, but now forming part of the Perrot patents. The two internal shoes, instead of being on separate pivots, are linked together, and there is only one fixed point. When the first shoe is brought into contact with the drum, through the action of the cam, the shoe is carried round with the revolving drum and pushes the second shoe, having a fixed point, into contact, the braking effort thus being in proportion to the

speed of the drum. With this device the danger of locking the front wheels is minimized. Stretched aviation cables are used instead of rods, experience having shown that the latter are liable to break, under city conditions, unless well supported.

For economical taxicab service the company has decided against the detachable cylinder head in favor of a fixed head with valves on one side. It is declared that the cost of lifting off cylinder heads and replacing gaskets puts this system out of the running when economy is the main consideration.

Buyer Given Choice of Carbureter

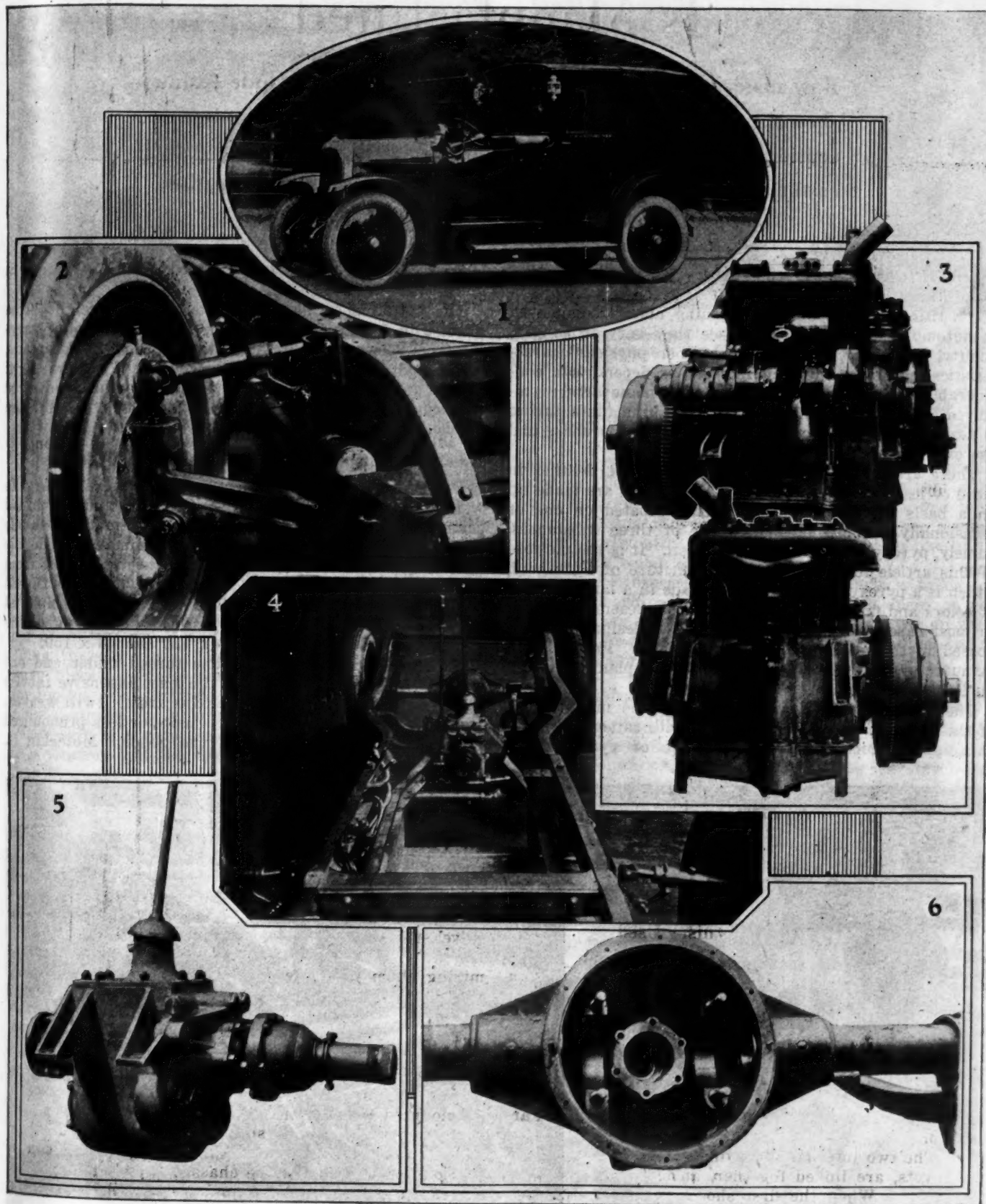
The engine has 70 mm. bore and 120 mm. stroke (2.7 by 4.7 in.). Valves are inclined in relation to the cylinder axis. A two-bearing shaft is used. It is inserted from one end, the aluminum base chamber thus being one casting to which the aluminum oil pan, containing the oil pump, is bolted. Oil is delivered direct under pressure to the two main bearings and along passageways inside the casting to the constant level troughs for the connecting rods. The quantity of oil in circulation is 2.6 gal., and the amount consumed in normal service is declared to be at the rate of 1 gal. per 3000 miles. One of the features of the lubricating system is a bypass by means of which the oil pump can discharge the oil outside the engine. The practice is to pump one-third of the oil out of the engine at certain intervals and replace it by fresh. The old oil is filtered for further use.

Delco ignition has been adopted, the generator and distributor being on the right side of the engine behind the timing gear housing. As Paris taxicab drivers buy their own gasoline, they are given a choice of either Solex or Zenith carbureter. The mounting is on the valve side with a two-branch intake manifold integral with the exhaust manifold. There is a water jacketed mixing chamber between the carbureter and the manifold. The cab is said to average 37 miles per American gallon on long-distance runs. The weight is 3410 lb.

The chassis frame members have a width of 25½ in. in front and sweep out to the full width of 40 in. near the center point. A sub-frame 19 in. wide receives the engine and is narrowed at the rear for the gearbox to be mounted directly on it. The change speed lever is on the top of the box; the shafts carrying the pedals and brake gear are under the frame members and can be dismantled from below the chassis.

A three-piece rear axle housing, comprising a central steel casting and two tubes has been preferred to the now more usual type of one-piece pressed steel housing, for in most cases of accident only one of the tubes has to be changed.

New French Taxicab with Front Wheel Brakes



1—New French taxicab operated by the Compagnie Generale of Paris. 2—Front wheel brake with which all cabs are fitted. 3—Right and left hand views of the four-cylinder, L-head engine. 4—Frame and sub-frame looking aft. 5—Three-speed gearbox. 6—The built-up type of rear axle

How One Make of Artificial Leather Is Manufactured

Raw materials employed in producing Fabrikoid include cotton sheeting, drills, sateen and moleskins to which are applied a coating of pyroxylin jelly containing a pigment ground in castor oil. Embossing is used to give grain resembling leather.

By Herbert Chase

ARTIFICIAL, or "fabric leathers," as they are sometimes called, are furnished in much greater quantities than any other trimming material employed in automotive construction. Since they vary in weight, quality, durability, strength, and other physical characteristics, and since these characteristics depend to a considerable degree upon the process of manufacture employed, a knowledge of methods used in manufacturing is desirable for all who have to do with the purchase and use of this important product.

There are three major varieties of artificial leather in more or less general use today. All of them are made up on a basis of cotton fabric, which is coated on one or occasionally on both sides with one of three substances, namely, pyroxylin, rubber, or linseed oil. It is the purpose of this article to describe the manufacture of Fabrikoid, which is a pyroxylin-coated fabric made in a large variety of colors and finishes, which very closely resemble leather in most cases, although other grains or designs are embossed in the material in some instances. Fabrikoid is manufactured in the Newburgh, N. Y., plant of E. I. du Pont de Nemours & Company, Inc.

The raw materials which enter into the manufacture of this product are cotton sheeting, drill, sateen, or moleskin, upon which is applied coatings of pyroxylin, to

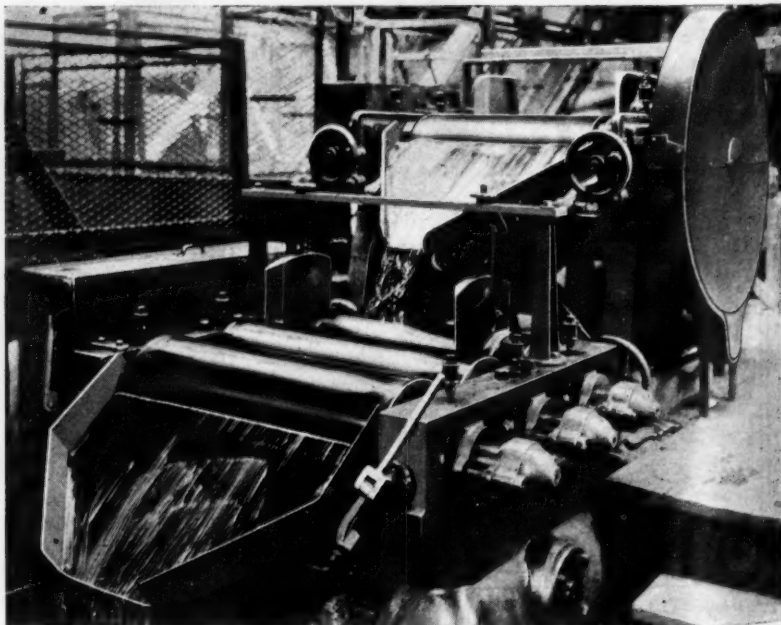
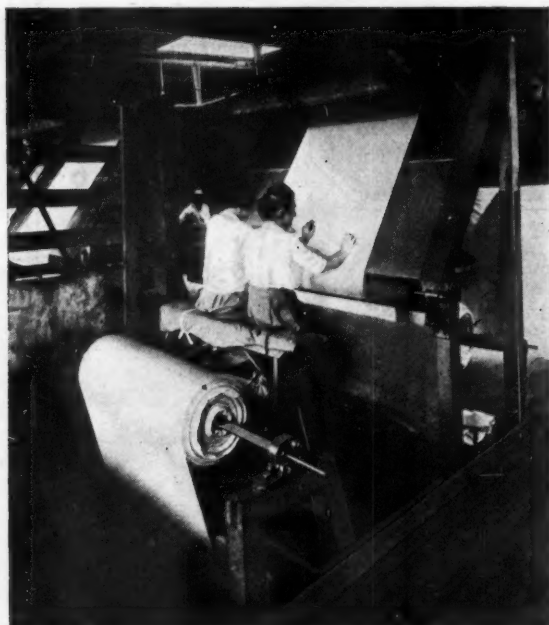
which substance is previously added a coloring pigment mixed in pure castor oil.

The cotton sheetings employed vary in weight from about 2 to 4 oz. per square yard, with thread count varying from 96 warp and 92 filler threads to 56 x 52 threads, respectively. Sheetings are largely used where light weight and relatively inexpensive fabric leather is desired and usually where the sheeting is hidden in the finished article.

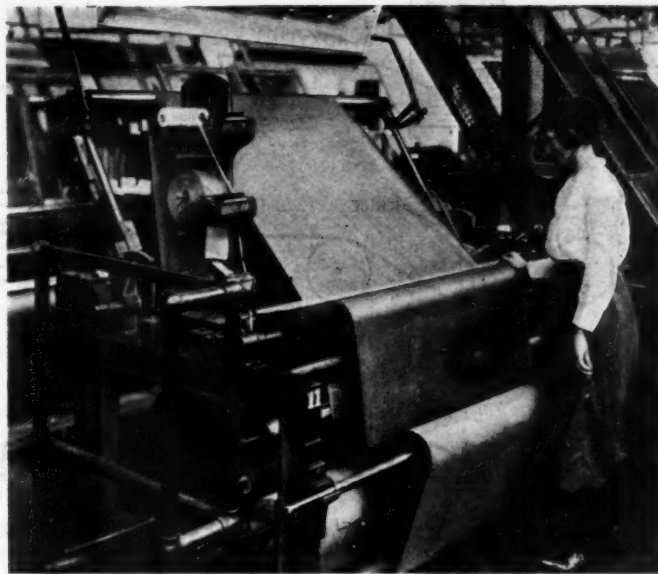
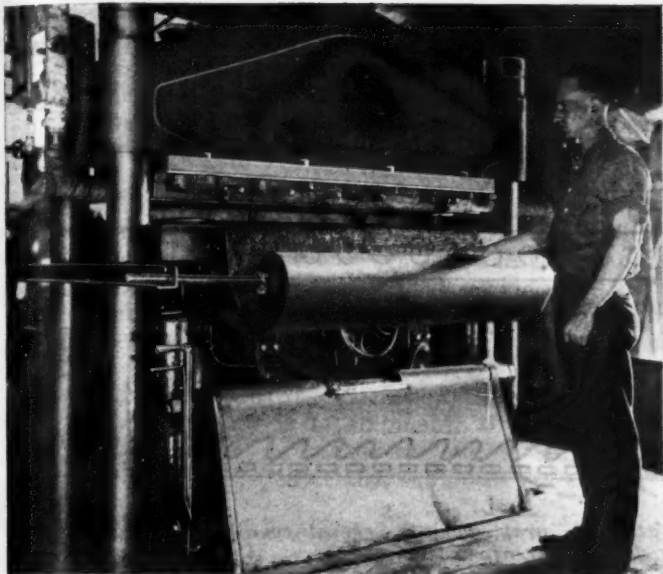
Variation in Cloth Weight and Weave

Drills used in the manufacture of Fabrikoid vary in weight from 5 to 11 oz. per square yard and in thread count from 68 x 40 to 88 x 58. A 5¼-oz. material is one of the most popular weights for both single and double texture goods. The sateens employed vary in weight from about 8¼ to about 9¾ oz. per square yard, the thread count usually being about 93 x 64. The moleskins employed vary from about 9¾ to 13½ oz. per square yard, the popular thread counts being 58 x 120 and 43 x 150.

Sheetings are plain weave, one thread under and one thread over, and in general are the least expensive fabrics used. Drills, sateens, and moleskins are all twill weaves, that is, a weave tending to give a more or less pronounced diagonal line on the face of the goods. Moleskin is,



(Left) Gray goods passing over picking frame where small surface defects are removed. (Right) Grinding machine where the pigment is reground and mixed with pure castor oil



(Left) Roll of Fabrikoid passing through a flat bed embossing machine where the desired grain is given to the coated surface. (Right) Machine used for final inspection and measuring of Fabrikoid prior to shipment.

however, a so-called broken twill which avoids to some extent the regularity of line found in drills and sateens and thus gives a more uniform surface. In drills the diagonal twill is produced by passing a filling thread over two or more warp threads and under one. The drills are largely used for automobile top and curtain materials, partly on account of the pleasing appearance the ribs give on the uncoated side.

In the sateens the diagonal twill is less pronounced on account of the finer yarns and closer construction usually employed. Sateens have a satiny appearance on one side of the cloth. This is brought about by using a large number of warp threads and so weaving the goods that the filling threads usually pass under several and over one warp thread. The sateens are considered less desirable for top material than are the rougher drills, but are especially desirable for upholstery purposes.

Moleskin is a very similar fabric to sateen except that it is heavier and the filling threads are more numerous than the warp, while in sateen the reverse is true. This weave gives a very soft surface to the moleskin and is the only one recommended for napping, a sort of picking with fine wire brushes intended to give the surface of the goods a nap or soft finish which somewhat resembles the under surface of a soft leather.

The fabrics used in making Fabrikoid are received in rolls averaging over 100 yards in length and varying in width from about 30 to 60 in. A sample is cut from the center and each end of each tenth bale and tested for weight, count, tensile strength, moisture content, and weave. The moisture content usually varies from 4 to 10 per cent by weight, the purchase being made by weight on a basis of $6\frac{1}{2}$ per cent moisture.

Unbleached Goods Preferred for Strength

As received, the fabrics are in the natural color of the cotton, that is, unbleached, and are termed "gray goods." In a few cases bleached goods are employed, but the unbleached are preferred for most purposes on account of the fact that they have about 10 per cent greater strength. Every bale received is carefully inspected for surface defects. This operation is carried out by girls who become highly proficient in detecting imperfections. Small surface imperfections, such as dropped threads, lumps or knots are removed. If more than ten major imperfections are found

in each 100 yards the piece is rejected and returned to the mill from which it is purchased.

The inspection process is carried out as the goods are slowly unwound over an inspection, or so-called "picking frame." The operator removes imperfections that might show through the coating of the goods if allowed to remain. During this process the yardage of the goods is automatically measured by a dial geared to one of the drums over which the material passes.

From the inspection machines the fabric is taken to a shearing machine, which operates at high speed on very much the same principle as a lawn mower. The knives in this machine remove all lint and dirt on the surface of the goods, the lint being drawn out by an exhaust fan.

Diastase Treatment Makes Goods Pliable

Following the shearing the goods are submitted to a so-called diastase treatment, which consists in passing the goods through a solution which changes the starch used in sizing to sugar, which latter is then dissolved out in water. This process renders the goods more pliable and insures their taking the dye more uniformly.

The gray goods are now ready for dyeing to the approximate color of the coating to be later applied. This improves the appearance of the finished material and in some cases makes the fabric less apt to show through the coating, especially when a thin translucent coating is employed.

Dyeing is accomplished on two different classes of machines, one known as a continuous dyeing machine, which is employed especially for the cheaper grades of material, and a second, called a jig machine, through which the material is usually given a large number of passes. In the continuous dyeing machine the fabric passes in series through three dye vats, while in the jig machines it is rolled and unrolled successively many times through a single vat containing the hot dye solution. Both the chemicals used in the dye and the dye solution itself are tested regularly in order to maintain, as nearly as possible, absolute uniformity in color. Before dyeing a large quantity of goods one roll is run through the dye solution and the resultant color carefully checked against a standard to assure a correct color on the entire patch.

In the jig dye machine better penetration of the dye is insured than in the continuous machine, but jig dyeing is, of course, a more expensive operation. In the dyeing

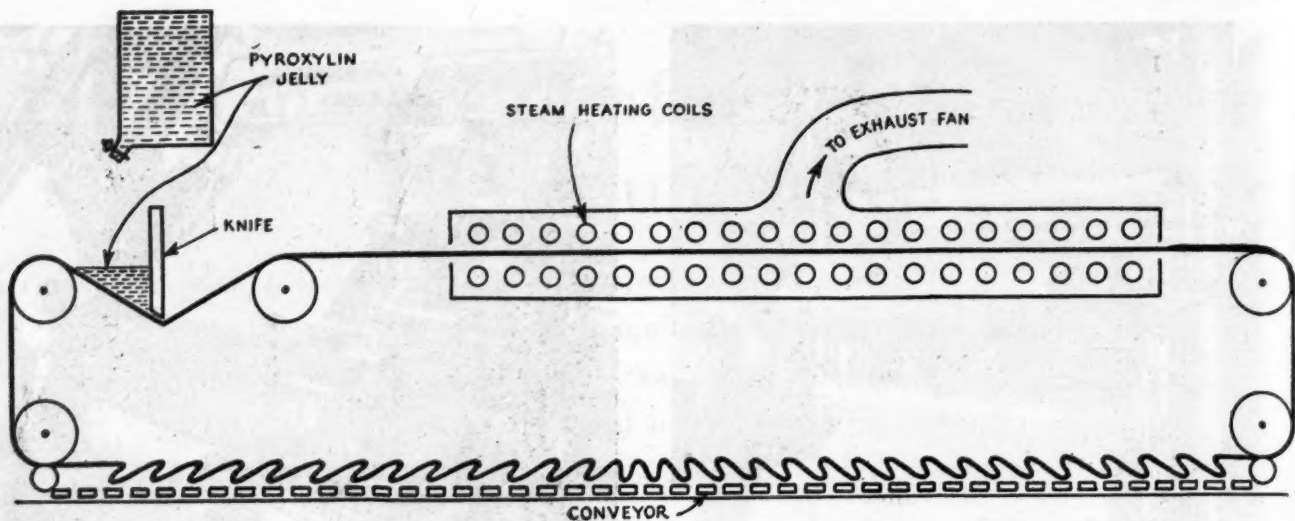


Diagram of machine used for applying pyroxylin coating to gray goods. Several coats are applied successively, each coat being dried after application.

operation the goods are purposely allowed to shrink, so that further shrinking in service is practically precluded.

Following the dyeing the goods are passed through mangles consisting of one bronze and two heavy rubber rolls to remove excess moisture. The fabric then is passed over so-called dry cans or a series of hollow steam-heated cylinders, which reduces the moisture content to the desired point. After this drying operation the goods are taken to tenter frames, machines which are in the form of long tables along each side of which are chains carrying dogs or clamps which take hold of the edge of the fabric as it passes through the machine. The chains are power driven and run parallel for most of the length of the table. Where the goods are fed in, however, the tracks carrying the chains diverge, with the result that the goods are stretched to a uniform width and all folds and wrinkles removed. After being so stretched, goods originally received in 56-in. widths measure about 52 in., the shrinking having occurred during the dyeing operation.

In the case of moleskins which are to be given a napped surface, the goods are next passed to a napping machine, which incorporates a large drum rotating at low speed. This drum is formed by a series of small cylindrical wire brushes, each of which rotates on its own axis at high speed. In passing in over these brushes the surface of the goods is picked, or given a nap. This, of course, decreases the strength of the fabric, but renders it soft and pliable and gives it a thicker body, which tends to give the finished product a feel and appearance similar to that of leather. This operation is carried out on the back of the goods.

Lint Removed from Fabrics

The final treatment which all fabrics receive before they are coated consists in brushing the surface in a rotary machine designed to remove lint. This machine is connected to an exhaust fan which carries away the lint.

Before describing the coating operation the method of preparing the coating will be briefly outlined. The basic ingredient of the coating is nitro-cellulose, or cotton staple, which has been treated with nitric and sulphuric acids in such a way as to render it soluble in acetone, ethyl-acetate, amyl-acetate, etc. The nitro-cellulose is mixed in an agitator or tank containing a mechanical mixing device with one of the solvents mentioned to which is added alcohol, benzol or another similar volatile solvent. This forms a pyroxylin solution which resembles a clear gelatine solution in appearance and is similar to collodion. This solution is carried by gravity through a large screen

or filter and is then forced through a second filter under air pressure. The pyroxylin solution is piped to the mixing room, where the coloring pigment is added.

Pigments are received in the form of finely ground powder, which are, however, passed through grinding machines and at the same time mixed with a pure grade of castor oil. The pigments used are ground separately. After grinding they are mixed in the proportions necessary to give the desired shade and color, which is carefully checked against a standard in natural daylight. When the pigment and oil are mixed the resultant paste is added to the pyroxylin solution and agitated in a closed vessel to assure thorough mixing. This forms a pyroxylin jelly, which is ready for application to the surface of the goods to be coated.

Pyroxylin Coating Applied by Machine

Coating is accomplished in a machine which is shown diagrammatically in an accompanying cut. As will be seen, the fabric passes over a series of rolls and under a knife, back of which is a trough the sides of which are formed by the fabric itself and the knife blade. A thin layer of the coating material adheres to the fabric, the thickness of this coating being controlled by the pressure of the fabric against the knife. After passing under the knife the fabric is carried through a chamber containing steam heating coils, which dry the coating and drive off the volatile solvent. The fabric then passes over another pair of rolls and is carried by a slow-moving conveyor back to the starting point, where it begins a second passage through the machine. From 15 to 18 coats of pyroxylin jelly are deposited in the case of most automobile fabrics, but in some instances where a heavier coating is desired as many as 30 passes through the coating machine are given. Some double-end machines with a coating trough at each end are also employed.

Immediately following the coating operation the Fabrikoid is subjected to careful inspection in machines designed for the purpose. It is then delivered to the embossing room, where it is passed through heavy embossing presses. Some of these are of the roller type, while others are flat-bed presses. Some of the latter are hand operated and others are automatic. The embossing dies used in these machines are heated and are designed to give the coated surface of the Fabrikoid the appearance of various types of leather, etc. The dies are made by an electroplating process, using a finely marked leather hide as the matrix, so that the die forms an exact duplicate of the

hide so far as surface texture is concerned, even the minute pit and pore marks being reproduced.

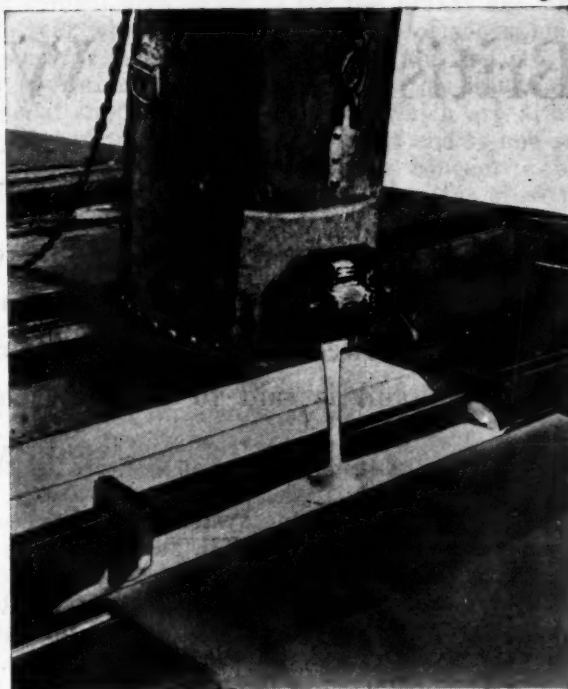
In case a two-tone fabric leather is desired, the entire coated surface of the embossed Fabrikoid is coated with a pyroxylin solution containing the second color. The surface is then rubbed off with a soft cloth, thus leaving the high spots in their original color while the valleys are filled with the second or contrasting coloring material. Various forms of Moorish, alligator, and other two-tone leathers are thus made, the resemblance to the genuine leather being exceptionally close.

On account of the light color and transparency of the pyroxylin solution, practically any color effect can be secured.

Following the embossing operation the Fabrikoid is carefully inspected prior to shipment. In this process representative samples are taken and these are carefully tested in a laboratory especially equipped for this purpose.

The tests to which these samples are submitted include measurement of the tensile strength, waterproof characteristics, adhesion of coating, and ability to withstand flexing and abrasion. These tests are supplemented also by tests in which the samples are exposed to the weather for long periods, and by tests made after artificial aging of the samples in an oven which is maintained at high temperature for a month. Samples cut from the aged pieces are tested at intervals of one week, so that it is possible to plot an aging curve which has been found to approximate closely the curve obtained in tests made under actual service conditions.

By following this procedure and by carefully checking all the materials employed in the manufacturing processes it has proved possible to maintain uniform standards to which all goods must conform before they are shipped. The standards not only assure uniformity in respect to



View of part of the coating machine. The pyroxylin jelly is enclosed in the trough formed by the knife A and the fabric

color, strength and other physical characteristics, but also insure durability in service. The testing methods used afford, too, a means for comparing the product from year to year. The manufacturers state that the product has been greatly improved during recent years, especially in respect to durability.

New Window Regulator Operates by Means of Eccentrics

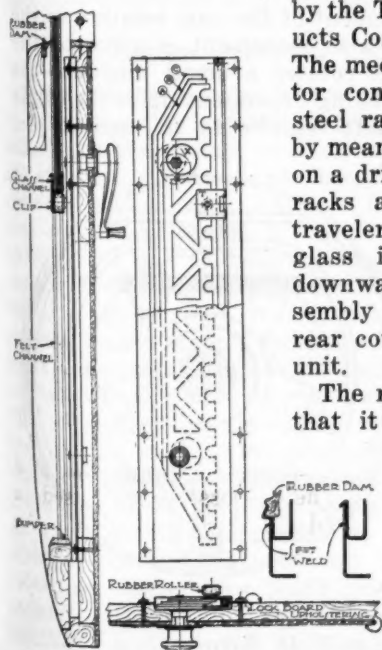
A WINDOW regulator incorporating a number of unique features and eliminating in its construction worms, gears, sprockets, chains, brackets, levers, ratchets and springs, has been brought out by the Toledo Automotive Products Co. under the name Copac. The mechanism for this regulator consists of three stamped steel racks (A, B, C) operated by means of eccentrics mounted on a driving shaft (S). As the racks are set in motion, the traveler (T) which carries the glass is moved upward and downward. Around this assembly are placed a front and rear cover which complete the unit.

The regulator is so designed that it locks in any position without the necessity of a clutch or any other form of locking mechanism. From the outside of the front cover to the outside of the rear cover, the regulator

has a thickness of 19/32 of an inch. The standard door model has an overall length of 21 7/8 in. and a total lift of 19 3/4 in. There are other models providing shorter lifts for rear quarters. These regulators are produced as a stock article, as the dimensions make it possible for them to fit into any door without the necessity of incorporating special adapter parts or fittings. The regulator is self-contained and requires no fitting. It can be mounted centrally to the front or to the rear of the lock board. Twelve mounting holes are provided to take care of variations in door design, but only four screws or bolts are required to hold it in place.

Although the regulator weighs only slightly over 4 lb., the manufacturers claim a lifting capacity of several hundred pounds. While it is designed to be capable of handling the most obstinate window, a small cross pin is incorporated in the upper shaft which acts as a safety valve and which stands a load of 250 lb. In case the glass should stick, this pin will fail before the glass breaks and the pin can be replaced without removing the regulator.

IN an article entitled "Thirty-three Cars Expected to Start in 500-Mile Indianapolis Race" which appeared in the issue of May 24, the statement is made on page 1116 that the front and rear axles of the Duesenberg chassis were built in the Duesenberg shop. The axles are of Duesenberg design but were built complete by the U.S. Axle Co.



British Front Wheel Brake Designed to Prevent Locking

Arrangement is such that on rounding a turn retarding force is less on outer than on inner wheel. No equalizer employed between forward pair of brakes. System forms unit with axle and is said to be unaffected by spring camber or deflection.

By M. W. Bourdon

A FRONT-WHEEL braking system which has some novel features is under test by several British car makers. This system has been adopted by one firm, and by another, not a car manufacturer, has been standardized with variations in axle design for fitting to numerous makes of existing cars. The system has been evolved and patented by Captain J. M. Rubury, who was associated with M. Perrot in introducing four-wheel braking on Argyll cars in 1910.

First among the special features of the Rubury brake system is the fact that when the wheels are turned to negotiate a corner the braking effect applied to the outer wheel is reduced slightly, while that on the inner wheel is relatively increased.

The brake shoe anchoring pin is supported by a back plate secured by four bolts to a flange integral with the knuckle forging, but above the center line of the axle itself.

The camshaft is below the wheel spindle and is coupled to the operating shaft by a fork and grooved-ball type of universal joint, the operating cam being of the usual flat-sided pattern. At its inner end the operating shaft is spherical, being supported by and free to move axially within a bush located in a boss integral with the main axle beam. The lever attached to the operating shaft is behind the axle and has a pronounced curvature to bring its end above the axle.

All parts of the brake and its camshaft and operating shaft are attached to the main and swivel axles. Off-hand this may be held an undesirable feature, because the pull of the cable, which runs directly back from the operating lever to a lever on the pedal shaft, exerts a rearward pull upon the axle and springs. But actually,

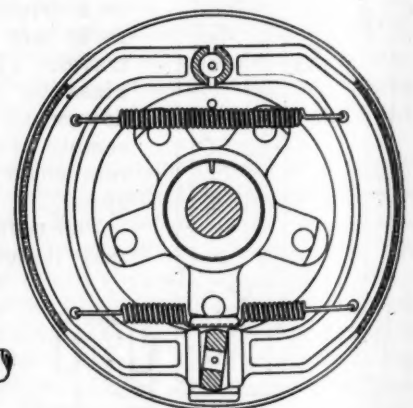
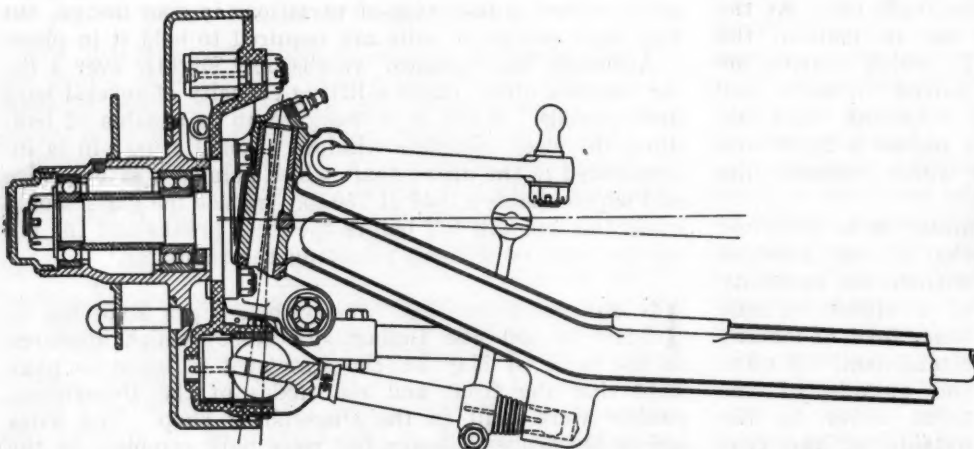
this is claimed by Rubury to be a feature of advantage, for the reason, he asserts, that the rearward pull is in opposition to the effect of brake torsion upon the springs and actually relieves the latter of that torsion to a varying extent.

Two other important advantages also accompany this plan, one concerned with regularity of braking effect and the other with production. From the latter standpoint it is preferable that the front axle shall form a complete unit with its brakes, rather than have some components which must be adjusted in relation to the frame during chassis erection. This point carries more importance than is generally realized for the following reason:

Effect of Cam Movement

It is usually considered correct practice in front brakes to so arrange the layout that the universal joint in the cam operating shaft has its center in the prolonged center line of the swivel axle pin, but this is not enough under all conditions to insure—as is generally imagined—that the pressure between brake shoes and drum remain constant with a given pedal or hand lever position. Even though the swivel pin be inclined so that its prolonged axis meets the ground at the central point of tire contact, the cam actually overhangs whether the wheel is splayed or not and therefore describes an arc about the axis of the swivel pin when the wheels are steered from the straight ahead position.

The effect of this movement of the cam relative to the swivel pin is to give it also movement relative to the brake shoes—in brief, it rotates a small amount—the extent of this movement being dependent upon the angle of the cam-operating shaft relative to the swivel pin.



Axle equipped with front wheel brakes based on British patents issued to J. M. Rubury

There is one angle, variable only within one or two degrees, at which cam rotation due to the movement of the swivel axle about its pin is practically negligible, but on either side of that setting this fortuitous cam rotation increases very appreciably. Where the latter state of affairs exists, variations in the clearance or pressure between the shoes and the drum occur when the wheels are steered to negotiate a corner and if—as may happen in those cases where the inner end of the cam-operating shaft is located by the chassis frame—spring deflections occur at the same time, the variations in shoe pressure or clearance do not remain constant when the amount of wheel deflection is varied. The angle of the shaft is then altered relative to the swivel pin axis and may either approach or recede still further from the ideal.

Servo System Unnecessary

We find a recognition of the foregoing in the big clearances—as compared with those in rear brakes alone—nearly always found necessary between front brake shoes and their drum. These increased clearances compel designers to provide a smaller leverage than they would otherwise, which accounts for complaints that directly operated front brakes are harder to apply forcibly and partly also for the need for servo systems. But apart from this consideration it is clearly a drawback that shoe pressure should vary fortuitously irrespective of pedal or hand-lever position on corners.

In front-brake systems where the cam-operating shaft is located at one end on the chassis frame, there are factors which vary the angle of the shaft other than those due to steering and spring deflection in running.

The camber of the springs, and therefore the angle of the shaft, may be altered by increasing the load either at the back or the front of the car.

So, in the type of construction generally considered normal, there is no way of insuring that a definite angle is maintained by the shaft. But when the angle is unaffected by spring deflection and can be assured within narrow limits by ordinary manufacturing processes, it can be set by the designer so that the very minimum of variation occurs when the front wheels are diverted in one direction or the other. It has been found that, with Rubury front brakes, a servo system is unnecessary so far as cars of medium size and ordinary use are concerned, even though both front and rear brakes are operated simultaneously by pedal.

Design Prevents Locking Wheels

Although front wheels are not easily locked, locking is not altogether remote, and the locking of both front wheels by the brakes on a corner immediately results in all steering control being lost, far more so than in the case of locked rear wheels. Rubury experienced this loss of control during his early experiments with front brakes and has therefore so designed his system as to reduce the pressure between the shoes and drum of one wheel and increase it on the other wheel when the steering takes place. To attain this result the universal joint between the camshaft and the operating shaft is not placed in line with the axis of the knuckle pivot. The off-setting of the joint center toward the center line of the car $\frac{1}{2}$ in. has no effect except when the brakes are in use or are applied on corners. Spring deflection does not call for the use of a joint here at all. As a result it is impossible to lock both front wheels when cornering: the outer one will always continue to rotate no matter how much pressure is applied to the pedal. Further, by breaking the inner wheel more forcibly the steering is assisted in the desired direction.

The control arrangements for the brakes are simple. In the rear wheel drums are two sets of shoes, side by side, one for lever application alone and the other for pedal operation in conjunction with the front brakes. The pedal shaft has four levers to which are attached the cables running direct to the front and to one set of rear brakes respectively, while the concentric hand-brake shaft has two levers for cables to the other pairs of rear shoes. Only the pedal therefore operates the front brakes. No equalizing device is embodied, but besides individual wing-nut adjustment at the end of each of the six cables, a central hand wheel is provided which adjusts all four sets of pedal-operated shoes simultaneously.

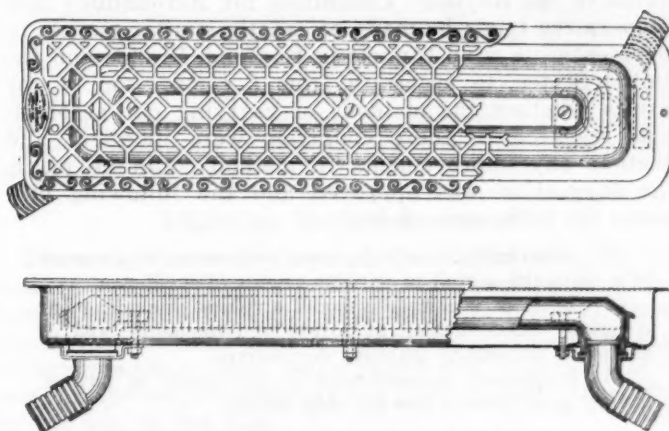
On a car weighing 3000 lb., having a four-passenger sedan body and an engine of 130 cu. in. capacity, the drums, both front and rear, are 12 in. in diameter and the shoes, all of them interchangeable, are $1\frac{1}{4}$ in. wide.

New Flush Type Car Heater

A NEW flush type car heater consisting of a pressed steel housing pan with cast aluminum cover plate and a cast heating coil, the invention of A. E. Linendoll, has been placed on the market.

Adjustable ells are carried underneath the heating pan and connect the heater with the valve on the exhaust line by means of flexible tubing. After the removal of three screws, the cover plate heating coil and clean-out-hole plate can be removed from within the car for cleaning. When re-assembled there are no connecting joints inside the heater pan, which is claimed to positively prevent the leakage of gas into the car.

The heater pan is provided with drain grooves, covered by a flange on the clean-out-hole cover in such a way as to prevent dust from entering the car through the heater, but allowing perfect drainage. The heat is regulated by means of a control valve attached to the exhaust pipe and controlled from the instrument board. This heater is made in three sizes, and we are informed that it has been adopted by several car manufacturers as standard equipment. It is being manufactured by the Norwalk Auto Parts Co. of which Linendoll is secretary.



Norwalk flush type heater

A WRITER in *Der Motorwagen* says that for spark plugs for high duty engines the single spark point type is the best, as with this type less heat is absorbed by the electrode and transferred to the shell. The central electrode for such plugs should be as short as possible and well protected, and the electrode connected to the shell should increase in diameter or cross section from the point toward the shell.

International Air Congress Stresses Cooperation in Research

Representatives from all countries gather to discuss science of aeronautics and review progress of the year. Wind tunnel experiments, slotted wing and engine developments considered. Further governmental support needed for commercial aviation.

WITH the object of bringing together leading men in aeronautical science and to review progress and stimulate endeavor in further aeronautical development in all its branches, an International Air Congress was held in London the latter part of June. The first international air congress was held in Paris in 1889, at the time of the World's Fair in that city. Since then other congresses have been held in Chicago, Milan and Nancy, and the last previous one was in Paris in 1921.

In order that all aspects of aviation might receive adequate attention, the congress was divided into four main groups, which met simultaneously each day.

One group of papers presented dealt with the standardization of methods of aeronautical research and of nomenclature. In this connection Sir Richard Glazebrook, formerly chief of the National Physical Laboratory, referred to the large amount of research work which is being done in wind tunnels in England and other countries and the errors which are introduced in converting the results obtained to full-scale models.

Glazebrook pointed out that there are various forms of tunnels and that we could hardly expect the results from all of them to be identical. Some three years ago the director of research for the British Air Service suggested to the Advisory Committee for Aeronautics that comparative trials be made of exactly similar models in representative wind tunnels in England, France and the United States, to ascertain from a comparison of the results whether the methods of carrying out aeronautical research in these countries were identical and whether any improvements in method could be made. The suggestion was approved and the following proposals for tests were made:

- (1) Determination of lift, drag, and center of pressure of a standard airfoil at various angles of incidence.
- (2) Tests of a complete model airplane, including the complete determination of forces and moments, and of the more important stability derivatives.
- (3) Resistance measurement at zero angle of yaw of a very good stream-line air-ship model.

Airfoil Test Cooperation

For airfoil tests it was decided to use a 6 in. by 36 in. R. A. F. 15 airfoil which had been cut by the Royal Aircraft Establishment. Applications to cooperate were received from several countries.

The airfoil tests at the N. P. L., where each of the five wind tunnels was utilized, occupied a year. A report on the British tests was drawn up and presented to the Aeronautical Research Committee in May, 1922. The model was then forwarded to France and the results

of the French Laboratory were received in November, 1922. These results were compared with the British and the agreement was quite satisfactory. A full discussion of the results will be made public only after all the data are in.

The models were next sent to the United States and at the time of the congress information had been received in England that the tests at the Washington Navy Yard and at the McCook Field tunnels had been completed and that it had been agreed to extend the work to the Bureau of Standards and Massachusetts Institute of Technology tunnels, provided it could be completed in three months. The models are then to be sent to Japan and later on the tests in European laboratories (Italy and Holland) will be completed.

Standardization of Research Impossible

In the discussion following, Major A. R. Low said that standardization of research was a contradiction in terms and he was glad that Sir Richard Glazebrook had repudiated it. He could not agree with the pretension of some critics that the errors due to scale effect made all wind tunnel tests useless. Model work was quite essential and a good deal of progress had been made in tracing the discrepancies between the results with models and those with full size work. A communication by E. P. Warner, presented by J. J. Ide, pointed out that the standardization of the methods of computing wing sections advocated by A. G. von Baumhauer was already in use in the United States. There was difficulty, however, in dealing with the question of dimensioning. Some method of fairing the section was desirable. Dimensions furnished by designers of airfoils were often such that it was impossible to draw a smooth curve through the ordinates. This could be overcome if designers would adopt some graphical device for fairing the curve at the time the section was first drawn. Several such devices were well known.

Lieut.-Col. Malone said that an aeronautical research department, in order to properly serve its purpose, should not be required to undertake routine testing. The divisions of research were, broadly:

(1) Pure scientific research.

(2) Technical research in the form of systematic measurement along established lines, and

(3) Application to design.

The subjects which the three methods of research should cover were aerodynamics, including airfoil research, compressed air wing tunnel work, stability and full-scale work. Another branch should be concerned with strength of structure and material, and the details of stresses involved in normal flight and under extreme

conditions, the results of this work being checked by full-scale measurements and tests. Research should also be conducted on power plant, including the development both of the present engine and of an engine capable of using a fuel of much lower flash point. He recognized that research workers were hampered by the want of appreciation on the part of those who held administrative posts.

Tensile Strength Highly Important

A paper of a different character was that on Light Alloys in Aircraft Construction, by A. M. Portevin and R. de Fleury, two French metallurgists who have specialized in light metal research. Discussing this paper, Walter Rosenhain said that he was interested in the subject because of the similar work that had been done at the National Physical Laboratory, with which he is connected. The results with magnesium alloys quoted in the paper were in general agreement with those obtained at Teddington. These very light alloys held a great deal of fascination for the aircraft engineer, but it must not be overlooked that there were serious difficulties connected with the general use particularly of magnesium alloys. The strength of these alloys did not exceed 40,000 lb. per square inch, as compared with 80,000 to 87,000 lb. per square inch for high tensile aluminum alloys. The authors of the paper held that the strength figure was not very important, but he could not agree with that view.

One special reason for attaching importance to the tensile strength was that the resistance to repetition stresses was often proportional to the tensile strength and in aircraft work this resistance was a highly important factor. Other objections to the use of magnesium alloys in aircraft work were their liability to corrosion, their high cost and their inflammability, which latter was a serious objection to their use in certain locations, particularly in the engine.

Development of Slotted Wing

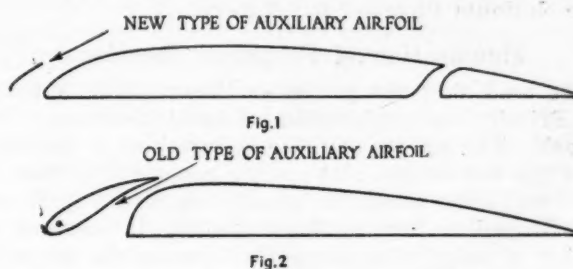
An interesting point arose in connection with the hardening of these alloys. The reason for the hardening of aluminum and certain other alloys had been ascertained and had thrown a great deal of light on the problem of hardening in steel. That being so, it was probable that a similar hardening process would be found in connection with magnesium alloys, and it should then be possible to get an improved tensile strength more comparable with that of aluminum.

F. Handley Page, speaking of the Slotted Wing, of which he is the inventor, said that the primary object of the slot in the wing was to extend the range of angles at which useful lift could be obtained and so increase the maximum lift coefficient. Several explanations of the phenomenon had been given. According to one theory, the rear edge of the front airfoil was in a region of increased velocity and diminished pressure situated over the upper part of the leading edge of the rear airfoil, while the reverse state of affairs obtained if the rear airfoil were considered. Considered from the point of view of the front airfoil the air velocity at its rear edge were therefore increased, and considered from the point of view of the rear airfoil below, it was diminished. The resultant effect was that the pressure gradient across the wing section was diminished and the tendency for the formation of eddies reduced. In consequence, greater maximum lift coefficients could be obtained.

The above considerations, however, did not explain the necessity for a certain shape and slot cross section if the results were to be obtained. The increase in maximum lift is chiefly dependent upon the chord of the auxiliary

airfoil combined with a good slot form. Considerable wind tunnel work on the best form of slot and auxiliary airfoil has been carried out. It has now been found that the single surface form of auxiliary airfoil, Fig. 1, gives a result equal to and in some ways better than a thick section, Fig. 2. In the first place it has the advantage that with the slot-closed condition the true basic section is retained, so that no increase in drag is brought about. Secondly, it obviates the tail adjustment that is necessary with the swivelling form of slot, Fig. 2, due to the backward movement of the center of pressure with the opening of the slot. This movement is practically negligible with the single surface type of airfoil, as the forward movement of the auxiliary airfoil practically compensates for the backward movement of the center of pressure.

An important advantage of the slotted wing is the possibility it affords of gaining increased lateral control



at the slow speeds of landing and taking off. With the single front slot only, full lateral control can be obtained in the usual manner. With the slotted flaps, particularly with the high-lift sections, an increase in rolling moment is obtained without a corresponding increase in yawing moment. This effect can be still further improved by differential operation of the ailerons as proposed and carried out by Captain De Havilland. Still more important, however, is the use of the front slot in conjunction with the ailerons for the prevention of burbling on the wing, which is lower and causing the high wing to burble.

With the type of slot in which the auxiliary airfoil is moved forward as a whole when it is opened, the center of pressure remains approximately at the same point with the slot opened and closed, and, therefore, no tail adjustment is necessary. The importance of this feature lies in the fact that at large angles of incidence, and consequent large tail angles, if the center of pressure moves backward, it is difficult to get the tail down at the moment of alighting.

Alighting Method Improved

There are two ways in which the slotted wing can be used in new designs, one with the same loading as in the normal machine to reduce the landing speed and improve the method of alighting, the other by increased loading to improve the present performance with a given weight per horsepower, maintaining the landing speed the same by the use of the slot.

In discussion the point was made that it did not offer a satisfactory explanation of the action of the slotted wing. H. P. Glauert said an essential feature was that on the main airfoil peak an important section on the shoulder was much reduced. Another point about the wings was that there was no real improvement at the same angle, but in some way the peak of a section of the main airfoil was cut off. A remarkable feature was the sensitiveness to the slot shape, but the exact border line between good and bad practice was hard to ascertain. It was brought out in the discussion that the slotted wing is at present

under test by the Air Ministry and that the results to date have been satisfactory. The work with full scale machines was not yet completed, however.

H. C. Watts, who is chairman of a panel appointed by the Aeronautical Research Committee to follow and, if necessary, to initiate research on air propellers gave an outline of the propeller research carried out in Great Britain during the war, which was rather spasmodic and disconnected, owing to the exigencies of the time, which demanded immediate solution of particular problems. After the war it was decided to lay down as a fundamental principle that all future research should be done on propellers having a known and definite relation to each other. The panel therefore did what had already been done by M. Eiffel in France and Dr. Durand in the United States, that is, it designed a family of propellers. The author described the different tests made with these propellers and gave some of the results obtained. The complete results of this research will shortly be published by the National Physical Laboratory.

Modification of Propeller Theories

Watts said that the propeller theory now in use in Great Britain is a combination of two independent lines of attack. The earlier of these is based on a consideration of the momentum and energy generated in the slip stream, while the second, originally suggested by Froude and developed by Drzewiecki and others, is based on the behavior of the airfoil elements forming the propeller blades. What is known as the current inflow theory is a combination of these two theories. It has been developed by Fage, Bothezat, Riach and others and is set forth in great detail by Bairstow in his "Applied Aerodynamics." Watts was of the opinion, however, that it had no very scientific foundation.

The panel had hardly started its work when a new modification of the usual propeller theories was enunciated by H. Glauert. Glauert reviewed the whole basis of propeller theory in the light of the circulation and vortex theory of airfoils developed by Prandtl and other writers, and developed a theory which, in form and method of application, very closely resembles the current "inflow" or combined theory, but which differs from it in fundamental ideas.

The most important conclusion obtained by Glauert is that the airfoil characteristics to be used in the various formulæ should be those corresponding to infinite aspect ratio or two-dimensional flow. He shows that this removes the discrepancy between the theoretical and empirical interference flows, which was the weak point of the current inflow theory, and in his revised theory it is possible to abandon the empirical "inflow" factor of one-third or one-fourth and to use the theoretical value of one-half. This theory is being checked against the experimental results from the family. The work is not yet complete, but sufficient has been done to say that the theory gives good agreement not only with experimental measurement of total thrust and torque, but also with the experimental thrust grading curves.

At one of the sessions several papers were presented dealing with general aerodynamic theory. Those of principal interest were: Some Aspects of Modern Airfoil Theory, by H. Glauert, and Circulation Theory of Lift, with an Example worked out for an Albatross Wing Form, by Major A. R. Low.

It was Lanchester who first announced the theory that the lift and part of the drag of an airplane are due to vortex motion of the air in the vicinity of the wings. This theory was developed mathematically on the Continent by Prandtl and Jowkowski. In Prandtl's work the problem was approached by making the assumption that

except within an infinitely short distance from the airplane surface, the air is in irrotational motion. He confirmed Lanchester's conclusion that trailing vortices spring from each wing tip. These tip vortices contribute nothing to the lift of the wings, but their formation obviously involves an expenditure of energy, and the German mathematicians have been able to calculate to a fair approximation the corresponding drag on the machine. This induced drag is additional to the ordinary surface friction, which is all that would be experienced by a wing of infinite aspect ratio. That a large aspect ratio is favorable to lift has been known for a long time, but until the above work was accomplished, theory provided no means for estimating the relative efficiencies of different aspect ratios.

Glauert's paper was devoted chiefly to a comparison of calculations based on Prandtl's theory with the results of experiments. He found that there is a very remarkable agreement between the calculated and observed pressure distribution, except near the tail. He drew the conclusion from Prandtl's theory that wind tunnel results require correction in order to reduce them to free air conditions. In most cases these corrections are small, but they are now being applied in actual work. Major Low's paper dealt with the work of Jowkowski. The latter has shown that once the stream line flow around a cylinder has been determined, it is an easy matter to solve the problem of the flow of air around a wing section. This can be done graphically. Prandtl assumes that the stream lines follow closely the outline of the wing, and this is undoubtedly true for small angles of incidence, but for stalling angles the stream lines separate from the surface, and a surface of discontinuity is obtained, the main flow separating from the "dead water" between it and the wing. In summing up the discussion Major Low said that Glauert and he deserved congratulations on the fact that Prandtl's theory was now accepted in Great Britain as of great practical value, whereas twelve months ago it was little recognized.

Possibilities of Crude Oil Engines

Work in the development of air-cooled engines which has been done at the Royal Aircraft Establishment at Farnborough, was reviewed by Wing Commander G. B. Hynes. Two single-cylinder units were developed, which in every respect compared favorably with the best-known water-cooled types. A single cylinder engine of $5\frac{1}{2}$ by $6\frac{1}{2}$ in. gave 43 hp. at 1700 r.p.m. with a fuel consumption of 0.5 lb. p. hp.-hr. The weight of the complete cylinder was 27 lb. and the maximum brake mean effective pressure was 137 lb. per sq. in. Work had been carried out on supercharging with a view to maintaining the output of the engines at high altitudes. In this connection an altitude chamber permitting of reproducing atmospheric conditions at 30,000 ft. altitude had been constructed. Exhaust-driven turbo compressors and gear-driven superchargers had been tested out in flight. Tests have also been made of a heavy fuel engine with auto-ignition and airless fuel injection. These were said to have been encouraging, but so far no satisfactory starter for such engines has been developed. Other lines of research carried on at the experimental department of the Establishment relate to torsional vibration of crankshafts, breakage of valve springs, characteristics of cooling systems and of ignition outfits.

A. E. L. Chorlton enumerated the advantages of crude oil as an aircraft fuel, its greater safety, its lower cost, susceptibility to the use of higher compression pressures, the possibility of dispensing with an ignition apparatus and the fact that it facilitates the production of a two-stroke engine. Referring to the weight of engines,

Chorlton said that about 4 lb. p. hp. was the maximum figure that would be acceptable to aircraft designers. The ordinary marine type Diesel engine weighs about 300 lb. per hp., but in submarine Diesel engines the weight has been brought down to about 60 lb. per hp. A photograph was shown of a 600-hp. Beardmore engine which runs on Mexican oil having a specific gravity of 0.90 and weighs about 3 lb. per hp.

The static radial air-cooled engine was dealt with in a paper by A. H. R. Fedden. The size limit for radial rotary air-cooled engines having been reached, in 1918 there arose a demand for an engine having similar characteristics but of much higher power, which in general performance and fuel consumption should compare favorably with existing water-cooled engines. Two engines of 300 and 400 hp. were built, but serious failures occurred and the type received a setback for a time. The difficulties encountered had now been eliminated, however, and at present the reliability, life and fuel consumption of this type of engine were equal to those of the best water-cooled engines. The weight of a 400-hp. radial air-cooled engine was said to be 25 per cent less than that of the lightest water-cooled engine with radiator and water. The advantages claimed for the static radial air-cooled engine are elimination of inertia torque, absence of radiators and water, simplicity and convenience of gearing, good performance under tropical conditions, compactness, convenience of manufacture and ease of mounting. The author dealt with the early troubles experienced with this type of engine, such as insufficient cooling, burning of valves, excessive fuel and oil consumption, trouble with big end bearings and trouble due to faulty installation. A very important point is that of oil temperatures, and according to the author the inlet and outlet temperatures of the oil should not exceed 122 and

167 deg. Fahr., respectively. The subject of maintaining the power at high altitudes was also discussed, the author expressing a preference for the use of a high compression engine with a bi-fuel system or with oversize cylinders.

After discussing the problem of air mail service the general conclusion seemed to be that while the results so far obtained were not very promising, yet the speed of air transport must count in the long run and the experiences gained on such lines as Paris-London and Cairo-Bagdad would prove very helpful in the future.

Two papers on commercial aviation were presented, one, by F. Handley Page and W. P. Savage, reviewing developments of the past and the experience already gained, and the other by Col. Cecil L'Estrange Malone, dealing with the subject of Government subsidies. Messrs. Page and Savage accounted for the slowness of growth of air traffic so far by the absence of any definite scheme of Government support. Such difficulties as those attending night flying and flying in low hanging clouds were, of course, still to be overcome and engine reliability still left a good deal to be desired, yet steady progress had been made and much experience gained.

J. D. North, speaking of the technical development of the airplane, said that the twenty years of aircraft development might be divided into four nearly equal periods, the pioneer period, the demonstration period, the war period and the post-war period. Each of these phases, he said, was sufficiently well defined that its limits were clearly observable. He said that future development could not be carried on on the heroic lines, the results-at-any-price methods that were proper enough during the war period; on the contrary, we must probably deal mostly with details out of the multitude of which great things might come.

New Bosch Armored Ignition Coil

A STEEL-ENCLOSED, hermetically sealed ignition coil is now being manufactured by the American Bosch Magneto Corp. This coil is designed for use with the Bosch battery ignition system, but may also be used as a replacement on other makes of ignition equipment. It can be supplied to operate on 12 volts. It is arranged for use with those timer-distributors having a condenser as part of their construction.

The new coil will be known as TC-30 and TC-40 and differs from previous Bosch types TC-4 and TC-20 in that the winding, magnetic circuit and all other integral parts are encased in a water-proof and moisture-proof steel housing. The internal parts are impregnated with an insulating compound, making the entire structure a single molded unit. Because of this construction the coil can in no way be affected by vibration, moisture, heat or atmospheric conditions.

The windings are arranged in a rather unusual manner in that the primary winding which carries the low tension current is wound around the outside of the high tension secondary wire; thus the heat generated in the windings is readily dissipated through the adjacent steel casing. No ballast resistance is required. In addition to the insulation of the wire each layer of wire is carefully insulated or protected from the preceding one.

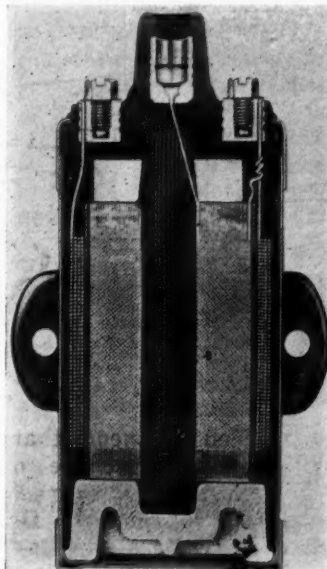
The windings, central core and outer shell of the magnetic circuit are supported on an artificial stone base of high insulating qualities. This gives a solid foundation to the entire structure. Another insulating stone base is placed on top of the windings and fills the space between

the winding and the molded top or terminal piece so that, should the coil be mounted in an inverted position, neither the core nor the windings will shift within the housing.

The entire unit is placed in an oven which is maintained at a temperature above the boiling point of water. The oven chamber is subjected to a high vacuum which in combination with the heat removes all moisture. While the coil is at this high temperature, a sealing compound is

forced into the container and the entire unit is sealed into one mass. The insulated top or terminal top piece, which is molded into and surrounded by a metal ring, is put into position and the metal ring and housing of the coil are soldered together, thus sealing the entire unit hermetically.

The coil finish is a high gloss, baked, black enamel. The mountings are of two kinds: TC-30 being the flange type and TC-40 the base type so that the coil may be mounted against the dash or engine in any position or upon a base as on an ignition unit.



Advantages of Permanent Tops Repay Added Cost of Production

Maintained good appearance a principal feature. Various problems of design involved. Side curtains can be stored best in back of front seat. Construction should permit use of closed-in panels. More general adoption by manufacturers in prospect.

By James Ferguson

THE permanent top is coming into more general use and many manufacturers may adopt it finally to the exclusion of the collapsible type. Various problems of design and production are involved, however, in the introduction of such a design feature.

Cost is of primary importance, of course, in producing any new kind of equipment. If the permanent top is made with detachable side curtains the cost of construction is practically the same as that of the older type. Framing, bows and metal quarter and rear side panels are just as expensive as bows and bow sockets for the folding top. The outlay for fabric covering is the same for both types, while the head lining for the permanent top is a little more expensive.

The newer top has one advantage over the collapsible type in that the material is held under tension and is prevented from sagging and drawing-in between the bows. Head lining and cover material usually are fastened to the quarter side rail and are finished flush to the under side. Fig. 1 illustrates how this can be done. It shows this rail in the elevation and A-A shows a cross section view with the bow and metal quarter panel.

When the top material is pulled tightly over the metal corner and held rigidly, it will remain shapely as long as there is life in the fabric. The metal panel will keep the wood rail from changing its shape vertically.

On the more expensive products a 3/16 in. by 1 in. iron runner, fastened with screws on the inside of this rail for the entire length of the side, will insure retaining its shape laterally. Ordinarily this rail is 1 in. thick and its inside is parallel to, and perpendicular in line with, the outside of the top edge of the body. The rear bow has the same conformation and the outside of the bow is 1 in. beyond the body line at the corner and rear.

It may seem paradoxical that this rear bow should be outside or beyond the body line at the corner when the measurement across the bow at C and D is practically the same. It will be noted, however, upon looking at the plan view, that the body line becomes rapidly narrower from the point D, and the bow with the side members straight or parallel to the center line will provide for the right amount of overhang at the corner. Placing this part of the bow behind a perpendicular from the body provides for the back.

Design of an Ideal Bracket

Most permanent tops now have a sheet metal corner as illustrated. When made without it they are sometimes fastened with a pivot at C to enable the top to be rotated at this point. In such cases the top does not collapse, and the tonneau can be loaded with camping equipment and bulky objects only by elevating the front.

Section through B-B illustrates a method of fastening

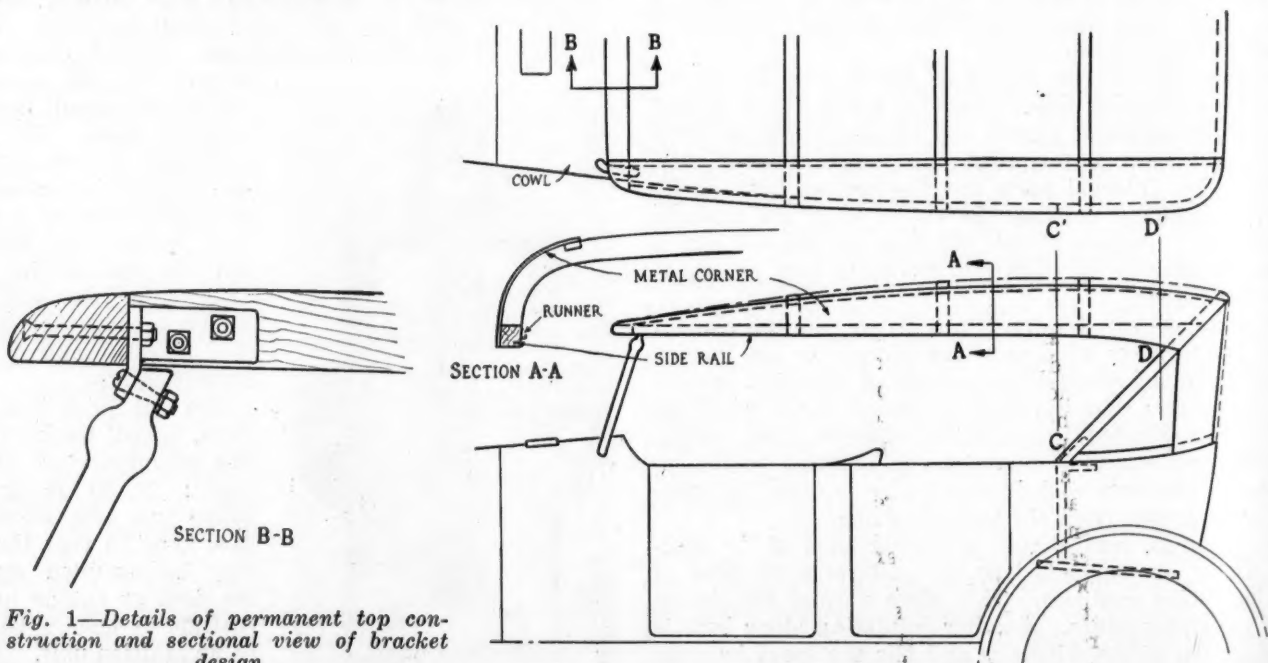


Fig. 1—Details of permanent top construction and sectional view of bracket design

intended to overcome difficulties encountered with the type of top now in use. Conventional windshields are made with the side arms terminating at the top in either a ball or threaded end. In each instance the fastening is through a bracket secured to the front cross bow and is so high as to make fastening difficult when the top is lined. The bracket was designed originally to be used on a top much wider than the body at the point of fastening, while the permanent top is narrowed at the front. The ideal bracket is one which will serve as a corner brace to reinforce the union of the front cross member and the side rail and then fasten to the windshield below so as to avoid having a cut in the head lining.

Storm Curtain Design Altered

Section B-B shows one way in which a bracket can be made which not only will brace the top corner but which can be readily attached when assembling the top on the shield. It also permits attaching storm curtains well up in the corner without interference.

Storm curtains usually are for use with door rods, but are not made in one piece with a flap to stop the wind at the top as is customary. The flap consists of one piece which runs the entire length of the top. It is fastened to the inside of the top rail and detached when not in use. When curtains other than those for the doors are used they fasten to the same buttons as the flap.

Storm curtains often are stored under the rear seat or in a pocket at the rear of the front seat. The former practice has little merit. Placing of curtains in a pocket in the roof is no longer desired and with a lined roof it is impossible.

A pocket at the rear of the front seat is far and above the most satisfactory arrangement for curtain storage. Sometimes a bellows pocket is attached to the seat back, but a space inside the back panel, as shown in Fig. 2,

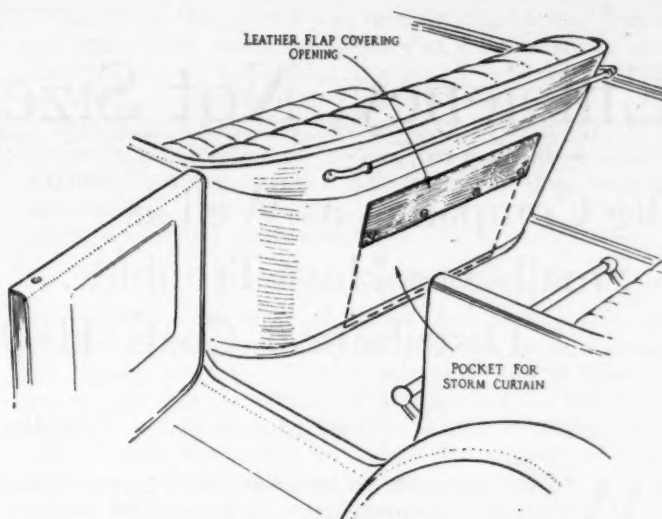


Fig. 2—Recess in rear panel with flap cover for curtain storage

is most desirable. In this illustration the pocket is indicated by a dotted line. The opening for the curtains is covered by a leather or imitation leather flap. A bellows pocket is used when no provision has been made for space in the body construction.

Closed-in panels are not used with many permanent tops because of added cost. This type of top, however, should be designed with their use in view. The public has always been ready to buy equipment to make the phaeton a winter car. Once the initial payment is made, the purchaser is reasonably certain to make further expenditures to insure greater comfort. This is especially true when the additional equipment can be installed without alterations to the body or top.

British Engineers Resolve Upon Three Gasoline Standards

THE British Engineering Standards Committee with the cooperation of various Government departments and bodies representing all branches of the automobile and aircraft industries has resolved upon three standard specifications for gasoline. The first is termed "motor spirit," intended for use in road vehicles, and the other "aviation spirit" for aircraft. No recognition is accorded to the second grade of motor spirit available in England and very largely used by bus and truck owners. Of the two grades of aviation spirit specified, one has a specific gravity of between .720 and .740 at 15 deg. C., and the other a specific gravity between .760 and .790 at the same temperature.

No specific gravity is mentioned for the motor spirit but the range of distillation is specified as follows: The first drop temperature shall not exceed 50 deg. C.; when 20 per cent by volume of the distillate has been collected the temperature shall not exceed 105 deg. C., and the whole of the liquid shall have distilled at 225 deg. C. It is also specified that the spirit shall consist of hydro-carbons and be free from visible impurities and mineral acid.

Many more factors are specified in detail in regard to aviation spirit. For example, in the case of the first grade (between 720 and 740 specific gravity) its appearance shall be water-white and it shall not contain more than a trace of cracked spirit (olefine hydrocarbons); the total content of aromatic hydrocarbons shall not be less than 12 per cent or more than 20 per cent by volume; the

toluene equivalent shall not be less than 10 per cent; it must be free from mineral acid and visible impurities and the sulphur content must not exceed .05 per cent by weight.

Not less than 35 per cent by volume of aromatic hydrocarbons is applied to the second grade aviation spirit, the toluene equivalent not less than 12 per cent and the freezing point below -60 deg. C. Distillation figures are given as follows: When 100 c.c. are distilled in the British Standard distillation apparatus at the rate of two drops per second, these shall distill at 760 m.m. pressure:

Aviation Spirit, 720-740 sp. gr.

- Below 75 deg. C., not less than 10 c. c.
- Below 100 deg. C., not less than 60 c. c.
- Below 140 deg. C., not less than 95 c. c.

Aviation Spirit, 760-790 sp. gr.

- Below 75 deg. C., not less than 10 c. c.
- Below 100 deg. C., not less than 50 c. c.
- Below 150 deg. C. not less than 90 c. c.

Concerning both grades it is specified that when 50 c.c. are heated on a bath of boiling water for one hour the residue shall not exceed .01 per cent by weight and shall be of an oily nature. In appendices to the specifications benzole is dealt with and the methods are given by which the total aromatic hydrocarbons and toluene equivalent shall be determined.

Efficiency, Not Size, Determines Success

Big Companies as Well as Small Ones Have Troubles; Distribution Costs High

By Harry Tipper

"WHEN are you going away, Jim?" asked John Carter, vice-president and production manager of the Planet Motor Car Co., of his sales associate, James Chance. "Vacation season is here and I'm thinking pretty longingly of that boat of mine down on the Massachusetts coast right now."

"I'm going off when the chief gets back, about the end of the month, I guess."

"You'd better figure on getting away before that, Jim," Henry Jones, the advertising manager, suggested. "You said that last year and you didn't get a chance till October. Then it was too late, so you didn't take it."

"Well, I know, but we've got it all fixed up this time so I start the day after he gets back."

"That's all right now," Calvin Farrell, the chief engineer, chimed in, "but you know what'll happen. He'll come back with his head chock full of ideas, like he always does after he's been up in the woods for a month, and he'll sell some of them to you so hard that you'll forget you intended to go. Why don't you start off next week and get a perspective on things so that you and the chief can have a real talkfest when he comes back?"

Vacation Plans

The men were lunching together at the club, in accordance with their usual practice and, up to this point, the conversation had turned on golf, vacations, fishing and other congenial recreations. There was a good deal of joking about the sales manager's vacations. He had maintained each year that he preferred to take a little extra time for golf, to which game he was devoted, getting a rest each week instead of going away for one. This year he did not feel satisfied with that idea.

The group turned to business by one of those quick moves characteristic of conversation between men who know each other well.

"Jim," Frank Lane, the treasurer, remarked, "did you hear that the Moonbeam people are in difficulties? I traveled home with a tire man who claimed to be one of the committee appointed by the creditors."

"What do you think of the chances for these small companies? Don't you think we are in for a lot of consolidations and a good many of the small fellows are going out of business? I don't just see how they are to meet the competition of the bigger makers with their advantages in manufacturing, raw material buying and financing."

"You don't want to assume that they have an advantage in manufacturing, Frank," said John Carter, "just because of size. Manufacturing cost differences are more and more a question of management and less a question of size of investment or equipment. It's a question of what the man will do and not so much a question of what the machinery will accomplish. Some of these fellows are always saying that they have eliminated the human ele-

THE future of small automobile companies occupies the attention of some of the Planet Motor Car Co. executives while the President is on his vacation. They decide that there is no cause for worry.

ment, as though they had solved the problem. They have tried to do so and they have succeeded in eliminating enough to spoil the loyalty, the interest in the work and that part of the human element that counts.

"There's probably some advantage in finance from the control of large facilities, but I do not believe there is any material advantage in this business from the actual manufacturing standpoint in large operations."

"That may be all right, John," replied Frank, "but isn't it true that quantity production enables the manufacturer to go through the processes much more cheaply than he can in any other way?"

Relative Costs

"Of course! There is no argument against that, but what is the difference between the man who is making 100,000 cars and ourselves on that score? We couldn't make our axles, for instance, but we can buy our axles from a man who can make them in quantity as cheaply as any car manufacturer in our price class. Same thing with the other fabricated parts that we cannot afford to make."

"That may be, John," broke in Jim Chance, "but why do you suppose so many of the small manufacturers have gone out of business? You and I could take a count of the old companies we have known and it would read like the roster of a graveyard."

"Size doesn't have anything to do with that race, Jim. Between 1904 and 1912 we could count up a lot of companies that came and went and yet the production of the entire industry was only 244,000 in the latter year. If you look over the companies that stuck through, you will see that they had some kind of a policy and they did not change for every little ripple on the surface. They had better management. Their present size is the result of their past management and not necessarily a *sine qua non* to doing business."

Small Companies Progress

"Outside of the Latin, John, I get you perfectly, although I don't go all the way with your argument. Most other lines of big business seem to be consolidating and run to big companies. Take the oil business and the Standard Oil Co., for instance."

"That's not a very good example, Jim," Henry Jones countered. "I used to know something about the history of that business. You'll admit the Standard Oil Co. was the dominant outfit before 1900 and was spoken of with bated breath by the scared mortal of ordinary size. Well! I knew a little company with a capital of \$3,000,000 at that time which successfully competed with the big outfit and grew first to \$18,000,000 and on until I don't know how many millions of capital it represents today. It is one of the biggest affairs in the country. That's not an

isolated case, either. In the last fifteen years, lots of new names have appeared in the oil business with just the rapid growth suggested by Ford.

"None of these organizations started out with size and a lot of capital. They were small until they proved themselves more able than their fellows and their present size is the result of that growth."

"Well, of course, when you put the matter in that light, I suppose there is no need for any manufacturer to worry about size only. Still it's natural to see the advantage of doing business on a big scale."

"That's just it, Jim," said John Carter, "the advantages are apparent and are constantly emphasized until they are thought to be much more important than they really are, while the disadvantages are not observed because few men are shrewd observers, and, as a consequence, success comes to the few in any line. No sir! I can't see any reason to fear for the little manufacturer unless he has been lax in his management."

Unity of Spirit Needed

"Not only that but you must remember that it is very difficult to maintain any unity of spirit in a large outfit. Why did you leave your old shop, Jim? It was one of the big ones and you were doing well there. You were ambitious and you wanted to get somewhere but you were tired of the formal management, the lack of human understanding and the general red tape rule and regulation of the place. You have told me many a time that you wouldn't go back and work in a big shop any more."

"You're right, John, I wouldn't. I get more fun out of my present job than I ever thought to get out of work. Of course, the worst part of a large company is the formality and the politics. Don't forget the politics. Small-minded men are always playing that game."

"There's another matter you fellows haven't mentioned as yet," remarked Jones, "and that's the cost of overhead in distribution and commercial business in this field. The cost of getting the cars from the factory doors to the user is increasing and the big concern is particularly susceptible to such cost changes. I was talking to a friend who is interested in a big business of another type, manufacturing an electrical product. Of course, it is not so complicated a process as an automobile. In fact, it is comparatively simple, so that the necessary investment in manufacturing equipment is not as great. He sells a particular type and size for \$24 to the public. This costs him \$8 to manufacture. He was not worried by the large competitor—he is one of the largest in the field—what bothered him was the competition of the small man. He said to me, 'I don't see how these fellows do it. I cannot get my costs of manufacture down to less than \$8. It must cost these men \$10 or \$12 and yet they sell a unit for \$18 retail, where I must charge \$24. I don't see how they make any money but some of them must be doing so according to their growth and their financial position!'"

Selling Expense Higher

"You haven't mentioned one important set of costs," I replied. "I get a little tired of the way you fellows are always talking manufacturing costs as though they were the only items that mattered. You probably have an expensive organization of branches, all sorts of complicated organization methods, service men to see that the products are kept in good shape, intensive selling methods to keep a certain volume coming your way and you have piled a lot of overhead on the back of that individual sale which requires a \$24 price to keep everybody happy. I know you will say you can't cut out any of these things, and I grant it, but you could probably cut some of them down a little and make a considerable change."

"However, the point I was bringing up to you, Jim, and you, also, John, was the existence of a lot of costly operations outside of manufacturing which need just as much attention as manufacturing costs, if not more."

"Granted, Henry, but how are you to help it? If you have a certain volume of product you must cover a certain territory in order to sell it and you must have your sales organization, your branches and your service in order to compete with the other man."

Minimum Not Reached

"Probably, in a sense, that's all true, just as John could say that he needs his machine shop, his pattern making, his presses and all the other paraphernalia he uses. He might say that he couldn't cut costs but he makes more cars for \$2,000 than he used to make for \$3,000 so that remark does not excuse us from the necessity of looking at this cost of distribution in the same way."

"All the time John has been reducing the price of the car and making it better, it still costs the dealer 25 per cent and he is now kicking for more to sell it. It still costs us about 30 per cent after John gets through with it. We haven't shaded our portion of the expense a bit. In fact, if we had the right cost accounting on it, I'd make a little bet that our per cent of the amount has increased."

"The chief sold me something that day he razed me about the advertising and I have been studying it ever since. It costs me more to get a piece of advertising done than it used to. It costs more to travel salesmen, in fact, every item of commercial expense seems to have increased and the funny part of it is that size seems to make the matter worse."

"That's another count against the popular notion that size is an advantage in itself. I have come to the belief that size is the result of the efficiency and opportunity of the men, like Ford, who saw something that could be done and did it. Furthermore, I think it is quite likely to be a liability to those who must carry the responsibility because that sort of capacity is quite rare. It is likely to get into the rule of committees and conferences and you and I know what that sort of proposition means to the initiative of an organization."

Prospects Bright

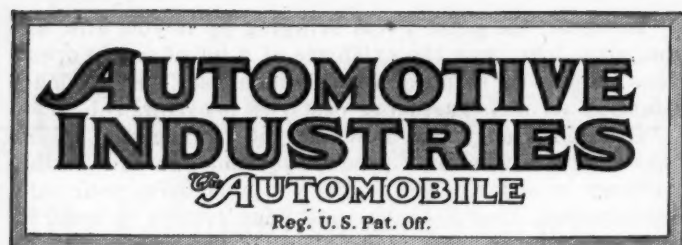
"Well! I seem to have stirred up something for a summertime lunch hour," laughed Frank Lane. "I see that there are a great many things to be considered on this subject and it will not do to make rash statements unless I want a talkfest instead of lunch."

"There's just one thing more," cut in Henry Jones, who always wanted the last word in an argument. "I see from the statistics that the ten leaders in the industry have made 85 per cent of the production for at least ten years and the rest of the production has been divided among about twelve or fourteen times as many manufacturers."

"Fifteen per cent of the 1912 production was about 34,000 cars and 15 per cent of last year's production was about 400,000 cars or nearly so."

"There were more companies living on that 34,000 than are now living on the 400,000, so the chances for a livelihood are certainly no worse."

AFUSE for the field circuits of automobile type generators with third brush regulation has been brought out by the Westinghouse Electric & Mfg. Co. This fuse, which blows when the field current exceeds 5 amp., serves to protect the machine when the connection between the generator and battery is accidentally broken. It is conveniently mounted on the end of the generator casing where it is accessible for replacement.



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Southern Market Promising

AS the crop season progresses there are increasing indications that the South will offer better opportunities than any other agricultural area for the sale of all kinds of products. The latest Government forecast predicts a cotton crop of 11,412,000 bales. The prevailing price is around 27 cents, or 5 cents more than at this time last year, and the quotation is more likely to go up than down for the rest of the year.

Even at present prices, unless there is a heavy shrinkage in the expected crop, cotton growers will collect \$285,000,000 more than they did last year for their product. It is evident, therefore, that they will not lack funds with which to make purchases. Most of them were able to pay their debts with the proceeds of last year's crop, which was produced with an excellent margin of profit.

Nor is the South so dependent as it once was upon its major crop. It has made material industrial ex-

pansion in the past five years and is steadily forging ahead in this direction. Its industries have been operating at capacity for a considerable period and there has been an unprecedented demand for lumber, one of its principal products.

Automotive manufacturers would do well to take these facts into consideration in planning sales campaigns for the next six months. They will find substantial business in the Carolinas, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas and Tennessee.

Grade Crossing Elimination

RAILROADS are doing considerable commendable work in attempting to lessen the number of accidents at grade crossings. It is badly needed, for 517 persons were killed and 1710 injured at these danger spots in the final quarter of 1922. A good many motorists undoubtedly are careless and pay dearly for their recklessness. Anything which will impress upon them the importance of caution at grade crossings is valuable, but the only permanent cure will be the elimination of crossings on highways which carry heavy traffic. This work has lagged because it is expensive.

Several States have agitated legislation requiring all users of the highways to come to a full stop before crossing a railroad track and a few have enacted such laws. General application of such a statute leads to absurd inconveniences, however. There are thousands of crossings at grade over branch line railroads which carry only half a dozen trains a day and often less. The highway traffic, on the other hand, often is heavy.

If either traffic is to be halted at the crossings on such lines it should be that on the railroad. Railroads give the right of way to the most important traffic and the same principle should be recognized by the States in making laws to stop traffic at rail and highway intersections.

This agitation for an absurd law has been valuable, however, because it has aroused public sentiment in favor of abolishing all grade crossings. It is significant that there are no crossings at grade on Federal aid roads.

Sales Influences in Engineering

IT is interesting to speculate about the relative influence of sales and engineering considerations in new models. New models are a yearly custom rather than engineering milestones. Every fall nearly every company announces certain changes in its product. Innovations have been minor in character for the most part in recent years, yet certain marked engineering achievements have appeared from time to time.

Obviously the advent of new models does not coincide exactly with technical progress. The former operates on a regular schedule. The latter cannot. Consequently it is logical to assume that the sales department is the chief factor in determining

changes made in many cases. New sales points are required and it is up to the engineering department to make changes of some kind each year. This pressure of sales demand on technical development is entirely healthy. It results in a long series of minor improvements which make the modern automobile a more comfortable and a more efficient vehicle.

In a smaller proportion of cases changes in new models are dictated almost entirely by technical considerations. The sales department readily makes capital of radical innovations, of course, and builds new sales arguments around them. An examination of the new models brought out in recent years, however, indicates that a majority of the changes made were desirable refinements rather than essential changes demanded by the progress of engineering knowledge.

Painting Cars in Colors

AN editorial in our issue of April 26 pointed out that the chief reason for painting passenger cars black is the lower cost of applying this color and its relative durability, especially when a japan which can be baked on at relatively high temperatures can be employed. We indicated that, from other standpoints, especially from the sales standpoint, other colors are much to be preferred, and suggested that laboratories might well develop other colors and methods of finishing which would be as inexpensive and give as durable a surface as black japans and similar substances.

It now appears that substantially this result has been brought about by the du Pont Company, cooperating closely with various automobile manufacturers. The new product is a pyroxylin base enamel which dries without baking almost as rapidly as it can be applied, can be made in practically any color and shade and is said to be much more durable than most finishing materials heretofore employed. No rubbing between coats is required and either a dull or glossy finish can be had.

One or two large car and body producers are understood to be just getting into production with this new finish, while several others are expected to adopt it in the near future.

This is a good example of the kind of result which can be attained by modern industrial research methods. Others may well profit by a similar extensive study of the same or related problems.

Pyroxylin base lacquers or enamels are by no means a new product. They have for several years been used with success for body finishing, it is reported, especially in localities where alkali dust causes rapid deterioration of other finishes. The new product referred to is understood to differ from the earlier pyroxylin lacquers chiefly in that means have been found whereby a much greater percentage of solid matter can be incorporated into the lacquer without unduly increasing its viscosity, thus reducing, in corresponding degree, the number of coats required to properly cover.

It is reported that other manufacturers of finishing

materials are at work on similar developments. If they are not, they certainly ought to be, for it is no secret that few problems have given car and body manufacturers more trouble than that of finding a type of finish which can be depended upon to give service comparable to that of most other features of their product.

There are few items which have a more important bearing upon the original sale of a car than its finish and few which affect its used value more profoundly. A finish which looks good when new and stays that way during the useful life of a car is an asset which is well worth a lot of effort to secure.

Another "Seasonal" Myth Dispelled

THE automotive industry is not the only one which has suffered from the "seasonal" habit. Building construction has been afflicted with it to a greater degree than anything else. Habit clings tenaciously, but it can be shaken off if the victim is jolted hard enough.

Secretary Hoover's committee on seasonal operation of construction industries seems about to supply the requisite jar to the building trades. It already has decided that seasonal construction is due vastly more to custom than to the necessities of weather.

Preliminary investigation shows that building throughout the United States is confined to a period ranging from seven to ten months, with a consequent period of depression, particularly for workers. This depression affects not only the building trades, but all other lines dependent upon them, and results in enormous economic loss.

While climatic conditions in many sections of the South are just as favorable to building in winter as in summer, building activities in southern cities closely follow the same seasonal ups and downs as the North. This is due entirely to long habit and the custom of auxiliary industries.

Much the same conditions would be found by Hoover if he appointed a committee to study the seasonal myth in the automotive field.

Employee Education Pays

A STRONG plea for the education of industrial employees in the fundamentals of economics and the details of the business in which they are engaged is made by Carl F. Dietz, president of the Bridgeport Brass Co. His workers are taught by means of lectures and simple visual illustrations.

Workers who perform certain operations on materials before they have approached completion often show little interest in their jobs because they never see the start or finish of them. They know little or nothing of the primary principles of economics, but they would be eager to learn if they had a chance.

It is discontent, frequently fostered by ignorance, which breeds radicalism, and anything which can be done in industry to lessen this ignorance will be well worth all its costs.

General Motors Has Its Best Half Year

**Profits of \$41,585,600 Reported,
with 397,318 Cars and Trucks
Sold**

NEW YORK, Aug. 1—Profits of \$41,585,600 for the first six months of 1923 are reported in the semi-annual statement of the General Motors Corp., just issued. In this period 397,318 cars and trucks were sold, and the net sales of all the corporation's products totaled \$362,819,353. Sales in both units and value were the largest in General Motors' history.

The regular quarterly dividends on the debenture and preferred stocks, requiring \$3,406,096, were paid, after which there remained for the common stock \$38,179,504. Two quarterly dividends each of 30 cents a share on the common stock, were paid, totaling \$12,272,076, leaving a balance of \$25,907,428 carried to surplus account from earnings.

Fisher Body Earnings

In its report the corporation states:

The corporation's statement of earnings reflects the earnings of the Fisher Body Corp. only to the extent of dividend received. If the General Motors proportion (60 per cent or \$5,889,808) of the undivided profits of the Fisher Body Corp. were included, the net amount earned on the common stock of General Motors Corp. would be \$44,069,312. This is equivalent to \$2.13 per share in the first six months on the 20,646,327 shares of no par value common stock outstanding.

The corporation is in excellent financial condition. Cash in banks was \$56,055,248, sight drafts \$10,220,439 and inventories \$114,725,627. The corporation has no bank loans. Current liabilities, including accounts payable of \$30,657,255, amounted to \$55,200,542, leaving an excess of current assets over current liabilities of \$150,196,212 as compared with \$126,476,237 at Dec. 31, 1922.

(Continued on page 249)

Plan Economic Courses for Delco Executives

WASHINGTON, July 31—A course for its executives in economics as applied to the automotive industry will be given by the Dayton Engineering Laboratories at Dayton, Ohio, manufacturers of the Delco product. Engineers of the engineering company are meeting this week with the Automotive Division of the United States Department of Commerce and representatives of the National Automobile Chamber of Commerce.

Representatives at the conference of the Dayton Engineering Laboratories are B. B. Bains, W. E. Baker, Edward Hughes, G. F. Christopher, Irving S. Paul, head of the New Economic Bureau of Distribution. Robert A. Jackson of the Department of Commerce, M. H. Hoepli, chief of the Automotive Division and A. Zimmermann, assistant to Mr. Hoepli, are representing the Govern-

Business in Brief

NEW YORK, Aug. 2—With the exception of the abundance of credit still available and the record freight car loadings, the definite signs of the week were for the most part unfavorable and showed unmistakable weaknesses in the industrial structure. Commodity prices continued generally downward, and the seasonal slack in trade and industry was reinforced by the general all-pervading element of doubt.

Sharp declines in rail, steel and oil stocks were general in the market during the last of the week. Unsatisfactory earnings precipitated rail shares, and unprecedented production of oil has swamped producers, while consumption has not increased in like proportion. Several commodities have felt the effects of the Ruhr situation keenly.

Freight car loadings for the week ending July 14 aggregated 1,019,667, an increase of 164,919 cars over the week previous. This is the second largest loading on record and was the sixth million-car week for the year. Forest products' loadings fell to the lowest point since February, indicating a probable decline in building activity. Grain and grain products declined, which probably indicates the holding back by the farmer in the hope of securing better prices for his products. The change in the character of loadings indicates in a measure the change in current business.

While there is a good deal of immediate buying of iron and steel, the recession in production continues, but indications point to a good fall business. Prices of iron and steel products continue downward, and this factor is doubtless responsible for some holding-off by purchasers.

The stock market continued to be depressed, such activity as was manifested coming from professionals, but was not sufficient to dislodge it from its lethargy. The bond market suffered from the same troubles. Investors appear to be holding off, and new offerings are light.

ment. Pyke Johnson and C. B. Reeves, both of the Washington office of the N. A. C. C., are representing their organization.

As a result of the conference with the Government officials, the Dayton Engineering Laboratories expect to secure statistics and other data which it can utilize in a study of economics as applied to the automotive industry.

Industry's Critics Flayed by Erskine

**Denies General Overproduction
and Reports Big Earnings
for Studebaker**

SOUTH BEND, IND., Aug. 1—"Professional prophets, pessimists and critics" are flayed by President A. R. Erskine of the Studebaker Corp. in his quarterly report on Studebaker accomplishments in April, May and June of this year, in which time 43,680 cars were sold as compared with 37,252 in the same period last year, while the net profits were \$7,200,202.

In his statement accompanying the quarterly report, President Erskine denies there has been an overproduction of automobiles and asserts that the remarks of some of these critics "work against productive forces of the country, undermine confidence in business and scare some people into inaction and undue caution, which leads to unemployment."

No Overproduction Exists

On this subject Erskine says:

Despite the lugubrious predictions of a prominent chart reader and prophet widely circulated quite recently, the automobile business is the liveliest prospect in the United States today. There is no over-production of automobiles, but there is an over-production in this country of fearful opinions and impressions by professional prophets, pessimists and critics. These destructive forces, working against productive forces of the country, undermine confidence in business and scare some people into inaction or undue caution, which leads to unemployment. Facts and not opinions and impressions are what we need, but, unfortunately, there is an acute shortage of facts.

Concerning the motor vehicle industry, the facts are that the value of its 1923 production to date puts it in second, if not first, rank in American industry, and it will hold this position for the rest of the year, and probably indefinitely. One billion five hundred million dollars of capital is invested in the automotive industry and over 300,000 people are directly employed by it. It is also one of the biggest consumers of raw materials and one of general industry's best customers. Business generally, therefore, cannot be prosperous in this country unless the automobile business is prosperous, and this fact might as well be appreciated once for all. With the railroads, it provides transportation and distribution, which, next to production, are our greatest economic necessities.

In reporting that the net profits after taxes were \$7,200,202, representing 9.4 per cent on the common stock, as against \$7,086,552 last year, Erskine points out that the higher prices which prevailed up to the time reductions were made, Aug. 1 last year, explain the relatively smaller net profits of this year. For the first six months of this year sales totaled 81,891 cars against 60,053 last year, with net profits of \$13,371,174 against \$11,156,401.

(Continued on page 248)

Output and Sales Keep Up Fast Pace

Preparation for New Models Slows Down Purchase of Materials

NEW YORK, July 30—Operations at automobile producing plants during July increased somewhat after the first week when returns received from a majority of manufacturers indicated that schedules had shown a curtailment of 20 per cent. Some of the major producers, as exceptions to the general rule of a lull in production activities, carried along on high schedules and, in the case of Ford new output and delivery records were made weekly.

Due to this increase and the operations of some of the major car makers, the total number of cars and trucks produced, while falling below the 378,882 reported for June, is not likely to show as great a decline as was indicated the first week. Improvement in August is not expected to be especially marked, if there is any improvement at all, despite the fact that many makers will be ready to turn their production facilities to new models, to which the finishing touches were put in July. The between-season period, featured as it is by a slowing up in retail buying, is not apt to be active in the manufacturing end of the industry.

Inventories Cut

Manufacturers who changed models during the past month have brought their inventories down to a low figure and have not yet entered the market in large numbers for future supplies. The industry as a whole is keeping in close touch with conditions in the general industrial field to detect any possible darkening of the sales outlook during the fall and winter. Schedules will not be determined definitely for the remaining months of the year until producers can assure themselves that a strong buying interest justifies them.

There is nothing now to warrant an impression that there will be a drop in retail sales volume other than what must be expected in the latter part of any year. The selling marks established in the first six months cannot reasonably be expected to carry over to the last six and be maintained at the same extraordinarily high level.

Sales during July were reduced from June but continued satisfactory, last minute purchases by vacationists keeping the volume from showing any

Next Business Slump Will Witness End of Exclusive Dealer Representation in Automobile Field

AN INTERVIEW WITH WILLIAM M. PURVES
General Sales Manager, Gray Motor Corp.

By D. M. McDonald, Detroit News Representative of the Class Journal Co.

Detroit, July 30.

THE next important business depression that hits the United States will witness the end of exclusive dealer representation in the general automobile field, said William M. Purves, general sales manager of Gray Motor Corp., discussing the future retail market this week. From it will emerge the automobile merchant, selling a complete line of cars from the lowest to the highest price class.

This condition may not come for five or ten years, he said, but sooner or later, in the course of events, a business crisis will arise that will bring this about. The reason for it, he declared, is that the cost of exclusive representation, except in the larger centers, is too high for the dealer in other than big business years. Even the best of the small town dealers cannot make money in lean years with only one line of cars.

Manufacturers of the leading lines of cars must come to realize this as well as those who are nominally outside the list of preferred sellers, he declared. They must be prepared to have their smaller town dealers stay in business by this means. This condition may be the cause of new consolidations in the industry, or it may be met by letting down the present exclusive representation bars by arrangements between factories in different price classes, but however effected, he said, the day is coming when it will have to be done for the preservation of the dealer.

Purves, though new with Gray, has long been identified with the industry, having served as a factory representative with Hupp, Wills Sainte Claire and with the Ford company. The small town situation has been made the subject of special study by him as the seat of most difficulty in the factory sales problem. Except in very few lines the small town dealer makes little more than his expenses, Purves said, where if he had the advantage of several lines he could make substantial profits.

There is a noticeable desire on the part of dealers to add to their representation at certain times, when cars in other than the price class they represent seem to be enjoying special popularity. This year there is evidenced the desire to take on small cars because of the unusual demand for cars in this class. Many applications have been received by the Gray company, he said, from dealers who can sell many small cars in addition to their regular run of larger ones—applications which, by the way, the company is unable to accept because of its present limited production.

Purves made no bones in admitting that much of the small car business which is coming this year to the newer companies is coming because of the great overflow business of older ones. But, he said, there is every reason to believe that a large part of this business will be permanently diverted if the owners find that their new cars are giving them as good or better service than the old ones.

Overflow business means absolutely nothing to the manufacturer who benefits by it, unless he is selling something that is going to give as good if not better performance than the preferred car, Purves said. No permanent business can be built around a second best car. If, however, the car on trial shows that it is sound, that it gives perhaps better mileage, or shows some other incidental superiorities, it is making reputation and soon will be a preferred car itself.

exceptional decline. This character of buying will be a factor in purchasing next month, but August is not expected to be a month marked by a large sales volume.

The June report of the Motor and Accessory Manufacturers Association shows excellent conditions prevailing during that month, the drop in purchases being but .059 per cent and the decline in notes outstanding showing a decline of 2.47 per cent from the May figures. Purchases of parts in June were \$55,067,500 as against \$42,000,000 in the same month of last year.

DISTEEL WHEEL TO MOVE

DETROIT, July 28—All plant equipment and machinery of Disteel Wheel

will be moved after Aug. 1 from the present Detroit Pressed Steel plant here and incorporated in the plant of Motor Wheel Corp. at Lansing. By Sept. 1 the executive force of Disteel will be located at the Motor Wheel plants. By purchase several months ago Disteel and Harvey were taken over by Motor Wheel, centralizing almost completely the disk wheel business.

NEW HAYNES SPORT BROUGHAM

KOKOMO, IND., Aug. 1—A new sport brougham is now being fitted to the Haynes 60 chassis. It is complete with sport equipment, including six cord tires, the extra ones being mounted at the front. The equipment also includes individual steps, trunk, protection bars, front and rear bumper and a rear view mirror.

Mitchell Creditors Desire Sale in Bulk

Strive to Keep Assets Intact—
Upset Price Fixed at
\$1,500,000

RACINE, WIS., July 30—Creditors of the defunct Mitchell Motors Co., Racine, Wis., upon receiving the report of appraisers, authorized Herbert F. Johnson, receiver, to entertain private bids for the property in bulk only, for thirty days, and informally fixed \$1,500,000 as the minimum bid that will be acceptable. In case no satisfactory bid is received, then the property will be offered for sale at public auction, with bidders privileged to bid in various parts of the assets or in bulk. Every effort is being made to keep the property intact. It is known that the receiver has been informed that a group of local capital is ready to make a bulk bid, while many offers have been received for certain machinery and equipment, as well as materials in stock.

The appraisers' report gives the current worth of the assets as \$1,819,851. Schedules filed by the Mitchell company upon the involuntary petition in bankruptcy in May claimed assets of \$3,742,722, and admitted liabilities of \$3,960,240.

The revaluation by the appraisers gives the worth of real estate and buildings as \$1,013,119; machinery, \$419,659, and material and other assets, \$387,082. This includes eight completed cars and approximately 1000 bodies, finished and unfinished. The completed cars will be sold at once, but offers for the bodies are held in abeyance because of the fact that they are considered a valuable asset in case the plant proper is taken over intact and the production of cars is resumed, although the product probably will bear a new name.

Harvester Chief Replies in Anti-Trust Law Suit

CHICAGO, July 30—With reference to the Government's suit filed in St. Paul July 17, seeking the dissolution of the International Harvester Co., under the anti-trust laws, Alexander Legge, president of the Harvester company, has issued the following statement:

This proceeding is a continuation of the suit brought against the company by the Government 11 years ago. The salient fact regarding it is the contract between the original charge and that now made. In the original suit, the charge, among others, was made that the company had unduly raised the price of harvesting machinery to the grave injury of the American farmer. The Government having failed to prove its first charge, now in this new proceeding charges the company with having made the prices of harvesting machines unduly low to the injury of its competitors.

To the farmers of this country who have been for years protesting that the prices of all agricultural implements were too high,

OLDS ADOPTS BONUS PLAN TO CUT WASTE

LANSING, MICH., July 30—A bonus system of operation has been put in operation in the leather-cutting room by the Olds Motor Works, which saves about seven square feet of leather or about \$1 a car. Employees in this department are paid for the leather they save rather than for the pieces cut. Three grades of cutters have been established, those using the least number of feet of leather being paid the highest rate per piece; those in the next grade are paid a little less; those taking more leather are paid the least of all. Factory executives believe that this is the ideal way of solving discontent and waste, as this system makes money for the employees when they are careful, and at the same time makes money for the company.

It will come as interesting news that the International Harvester Co. is charged with violation of law because it sold its harvesting machines too cheap. The efficiency of the company is charged as an offense. The Government asks a dissolution of the company to destroy this efficiency. As the offense was in making the prices too low, the object of the suit is to compel higher prices.

The case is certainly anomalous. It will be watched with interest. The farmers especially will be anxious to learn whether the forcing of higher prices for machines is for the public good and compelled by law.

Willys-Overland Report Will Show Big Earnings

TOLEDO, July 30—Statement of the Willys-Overland Co for the first half of the year, which is expected to be issued in a few days, will show earnings for that period amounting to approximately \$7,500,000 after all charges, including adequate depreciation and Federal taxes, have been deducted, it is understood.

This is equivalent to \$34 a share on the outstanding preferred stock amounting to \$22,049,500, on which dividends have been passed for two years.

President Willys announced a few days ago that the company now had cash on hand amounting to more than \$8,000,000 and would soon pay off the remainder of \$6,000,000 on its first mortgage notes due in December.

Business is holding up remarkably well, reports of the company indicate.

HAYES WHEEL PLANT READY

DETROIT, July 28—Hayes Wheel Co. has completed additions to the plant of its subsidiary, the Albion Bolt Co., Albion, Mich., and will go into production Aug. 1 on a schedule of 600,000 bolts and nuts a day, as compared to 350,000 formerly.

Gasoline Use Lags Far Behind Output

Production Flood Causing Some
Refineries to Close—California Fields Responsible

CHICAGO, July 28—The flood of gasoline that is being poured out upon the nation at a rate of increase much greater than the increase of consumption was the subject of two important conferences here this week. The American Petroleum Marketers' Association, representing retailers, met early in the week and suggested reduction of four to six cents a gallon in the price of gasoline as a step that would stimulate consumption to the level of production.

Refiners argued against this proposal, with the result that the marketers' association made no definite recommendation, but appointed a committee to investigate the situation.

The refiners represented by the Western Petroleum Refiners' Association met later in the week and decided the solution of the problem is to close down their refineries for the whole month of August. About 25 refineries, with a production of 112,000 barrels a day, are reported as having agreed to this proposal. Among them are Cosden & Co., Marland Refining Co. and Sinclair Refining Co. Most of the mid-continent operators, except the Standard Oil interests, are understood to be included in the arrangement.

In support of their position the refiners state that at present the average daily production of crude oil is 2,225,000 barrels, as compared with 1,250,000 barrels a day last year, an increase of about 90 per cent. Contrasted with this, they declare, the increase in consumption is only about 25 per cent. It is their contention that the best interest of the country will be served by shutting down the refineries and conserving the oil, rather than by drastically reducing the price to cause it to be consumed. The increase in production is coming largely from new California oil fields, according to the refiners, who believe that this source will begin to fail within a year.

BUILDS BALANCING MACHINE

The Precision Balancing Machine, which was described in AUTOMOTIVE INDUSTRIES in the issue of March 2, 1922, is now being manufactured by the Gisholt Machine Co. This machine is the invention of Dr. B. L. Newkirk and is noteworthy for its ability to simultaneously establish both dynamic and static balance of a broad field of automotive parts under comparatively simple operating conditions. The part to be balanced is rotated at relatively low speed, and corrections are determined by two direct-reading indicators and a vernier adjustment at the head of the machine.

N. A. C. C. Seeks Aid in Safety Effort

"Ten Commandments" Prepared by Chamber for Education of the Driving Public

NEW YORK, July 30—A tag to be tied to the steering wheels of new cars by either manufacturers or dealers, impressing upon the new owner the fundamentals of driving, has been prepared for distribution by the National Automobile Chamber of Commerce as propaganda in the campaign for safer highways which it is carrying on.

On this tag are printed a few simple traffic rules as "Ten Commandments of Safety for Motorists." Both manufacturers and dealers are urged to use them, and it also is urged that the commandments be published in instruction books issued by the factories. The commandments are as follows:

I—Always remember you are an engineer, fully responsible.

II—Always test your brakes when starting; and have them inspected frequently.

III—Never pass a street car when it is stopping, or, if the law permits, proceed very slowly past it at the legal distance.

IV—Exercise special care in crossing in front of a street car or in passing it, as you cannot tell what may be coming on the other side.

V—Always signal with hand when slowing down, turning or stopping, even though you have an automatic or mechanical warning signal.

VI—Look before you back, and sound the horn three times.

VII—Try to drive with using the horn as little as possible. A sudden noise may stop pedestrians in their tracks rather than warning them.

VIII—Don't count too much on the common sense of the other fellow. No one is 100 per cent alert all the time.

IX—Drive slowly in streets where children are playing. Remember your own childhood.

X—Cross crossings cautiously. Warning bells may be out of order, watchmen or gate operators may be off duty. Trains cannot stop as quickly as you can. Shift into second to avoid stalling on tracks.

Ford Produces Wood Pulp From Body Plant Refuse

DETROIT, July 27—Ford Motor Co. is producing wood pulp from scrap hard wood from its body plant at the River Rouge, by what is known as the soda process. Experiments over a period of several months at the Rouge plant paper mill finally resulted successfully and manufacture is now proceeding on a large scale. New equipment is to be added which will permit of large increases in present output.

By the process scrap lumber is chipped up in a machine and then carried by suction to a large digester. About nine tons of chips are placed in the digester as one batch, which averages about 75 per cent. hard maple, the remainder oak, ash and other hardwoods. To these

are added about 4,500 gallons of caustic solution of sufficient strength to reduce the chips to high quality fiber under seven hours' cooking at 110-pound steam pressure. When the digesting process is completed the fiber is pumped into washing machines and comes out 100 per cent. wood fiber ready for paper manufacture.

Production is at present confined to making binder boards, .075 to .030 of an inch thick. Operating on a twenty-four-hour schedule the mill produces 26,480 finished pieces and in addition turns out 1,000 boxes for shipping purposes.

Curtiss Navy Seaplane Breaks World's Record

NEW YORK, July 31—Lieutenant Rutledge Irvine in a Curtiss-Navy twin pontoon racer has broken the world's seaplane record, showing a speed of 175.3 m.p.h. over a 4.26-mile course on Long Island Sound near Port Washington yesterday. This flight was against a twelve-mile head wind. Irvine's plane is one of three that will represent the American Navy in the Schneider trophy races off the Isle of Cowes on Sept. 30.

Crane Now on Staff of General Motors Corp.

NEW YORK, July 30—Alfred P. Sloan, president of the General Motors Corp., announces today that Henry M. Crane has been appointed technical assistant to the president, with headquarters here. For many months past Crane has acted in a consulting capacity to the General Motors Corp., and has been closely associated with Sloan.

Crane is best known as the designer of the Crane and Crane-Simplex cars and for engineering work done during the war for the Wright-Martin Aircraft Corp., which at that time was engaged in manufacture of aircraft engines. He also was consulted in engineering matters pertaining to the Liberty aircraft engine.

Crane has been for several years prominently identified with the Society of Automotive Engineers, both as an officer and as chairman of various committees including the Research Committee. He now holds the office of vice-president of the S. A. E., and has been nominated to succeed H. M. Alden at the conclusion of Alden's term of office as president of the society.

WISCONSIN BUYS AXLE BUSINESS

CHICAGO, July 30—The Wisconsin Parts Co. has purchased the front and rear axle business of the Savage Arms Corp., which is located in Sharon, Pa., and Utica, N. Y., President W. F. Rockwell announces. The purchaser takes over the entire inventory, dies, tools, patterns, patents and designs, all of which will be removed to the Wisconsin plant. Additions to the plant are now being made to provide facilities for handling the new business, and new machinery is being installed.

Heavy-Duty Trucks Growing in Favor

General Motors Reports Gain of 284 Per Cent in Sales of Larger Models

DETROIT, July 30—New sales records for the first six months of any year were set up by General Motors Truck Co. in the first part of this year. The remarkable part of the record is presented by actual sales of the heavier trucks, the company declares, these showing a gain of 284 per cent over the same period a year ago, while the general increase in sales of trucks of all weights was 171 per cent.

Increase in business in the heavy-duty truck is ascribed by the company to the fact that operators have begun to realize that it does not pay to overload a light truck; that increased business throughout the country is increasing loads to be transported, and that operators are in better financial condition and can buy and operate the heavier trucks. National figures show the one-ton truck to be far in the lead in number in operation but that heavy trucks are supplanting them in many instances.

During the last six months of the year the company believes truck business will be as good as in the first six months and production schedules outline the continuance of present operations.

Gray Reports Production of Over 150 Cars Daily

DETROIT, July 28—Gray Motor Corp. is now building upwards of 150 cars daily and has orders on hand covering operations for the next sixty days. The company reports many requests for dealer franchises, which it is unable to accept at this time because of its inability to meet orders from its present dealer organization. Many applications are being received from dealers now handling medium-priced lines, who are desirous of adding a light-car line, a condition brought about, said William M. Purves, general sales manager, by the unusual demand for light cars as evidenced this year.

VALVE CONCERN TAKEN OVER

DETROIT, July 30—The Gas Engine Valve Co., 2900 Meldrum Avenue, has succeeded the Greiner-Long Co., manufacturing poppet valves. George D. Grant of Grant Brothers Foundry and Grant-Marx Brass Works, and formerly vice-president of the Grant Motor Car Co., is president; C. J. Long, vice-president; Carlisle R. Long, secretary and treasurer, and Adolph Greiner, formerly president of the Grant-Long Co., general manager and master mechanic. Greiner and Long are the inventors of the Grant hollow-head valve and hold basic patents on this type of valve.

New Models Will Cut August Production

**Factories May Be Unable to
Reach Former High Peaks
This Month**

DETROIT, Aug. 1—High production marks in August will suffer because of difficulties manufacturers will experience in getting schedules of new models fully under way. There is no lack of demand from dealers; in fact, executives at the factories seem worn with their efforts to meet business from dealers and at the same time convert plants over for the manufacture of the new lines. The point emphasized by leading manufacturers is that the business is there, merely waiting the speeding up of plants.

Under the existing good market conditions throughout the country and with the additional stimulus of new models, manufacturers declare there is no possibility of a letdown from peak manufacturing points inside two months at the earliest. They say dealers in leading lines are reported entirely clear of stocks of new cars and with many advance orders. The used car condition is well in hand, manufacturers assert, and can have no effect on new car business for the present at least.

Big Makers Increase Output

The month will witness four of the large producing companies, Buick, Studebaker, Dodge and Hupp, getting into production on new models exclusively, but probably not reaching full production until later in the month. Buick's schedule of 225,000 cars for the fiscal year means a monthly average of 18,750. Studebaker schedules are for about 600 daily, Dodge with its assembly building will have immediate capacity for 1000 daily, a figure which probably will be reached within the month. Hupp will start the month with somewhat more than 100 daily, working up to close to the 200 mark.

Ford with no change in models continues right along on its schedule of approximately 7,000 daily, with orders from dealers continuing to exceed 300,000 monthly. Deliveries of Ford cars to buyers in most models requires sixty days.

Chevrolet continues at about 1,500 daily. Star at Lansing is exceeding 300 daily and Gray is exceeding 150. Both of these companies also declare orders from dealers to be sixty days ahead of output.

In the medium-priced field, companies which are not making changes in models at this time report continuance of schedules at approximately the same figures as maintained in July. This means that Hudson-Essex will produce at the rate of about 400 daily, Paige-Jewett at about 200, Reo at upward of 150, Rickenbacker 60. Oldsmobile and Oakland are undergoing plant changes which will keep production low for the present month.

In the higher priced lines Cadillac with the completion of its inventory and plant changes is again on a schedule of upward of 100 daily and Packard is operating at about the same mark, the single-six being the big production model. Wills Sainte Claire is gradually extending its output as the reorganization plans become effective.

Gradually increasing prices in most lines are steadily becoming effective, without, however, at this time, having shown any adverse effect upon sales. In the face of the generally good financial condition of the country, these small increases are not expected to affect buying.

In the face of good market conditions for most agricultural products, farm buying is expected to be healthy for all cars, with the low priced lines having the greatest demand. It is generally believed that the farmer will be an extensive buyer in many lines of merchandise as the year progresses and that this will keep city buying of automobiles at high mark. In accomplishing the work of equipping the factories for new models, manufacturers feel that the big immediate problems have been met, and that continuing sales will show that the changes were warranted.

New Buick Prices Range from \$50 to \$130 Higher

DETROIT, Aug. 2—Prices of the models in the new line announced yesterday by the Buick Motor Co. are higher by from \$50 to \$130 than the lists on the old models. On the four-cylinder the range is from \$70 to \$100 and on the sixes from \$50 to \$130, the top advance being on the seven-passenger 128-in. wheelbase phaeton.

The new list prices are as follows:

4 CYL. MODEL	Old Price	New Price	Increase
Chassis	\$ 725	\$ 800	\$75
2 Pass. Roadster.....	865	935	70
5 Pass. Phaeton.....	885	965	80
4 Pass. Coupe.....	1,325	1,395	70
5 Pass. Sedan.....	1,395	1,495	100
6 CYL. MODEL, 120 W.B.			
Chassis	\$ 975	\$1,135	\$160
2 Pass. Roadster.....	1,175	1,275	100
5 Pass. Phaeton.....	1,195	1,295	100
4 Pass. Coupe.....	1,935	1,995	60
5 Pass. Sedan.....	1,985	2,095	110
Double Service Sedan..	New	1,695	—
6 CYL. MODEL, 128 W.B.			
Chassis	—	1,385	—
7 Pass. Phaeton.....	1,435	1,565	130
7 Pass. Sedan.....	2,195	2,285	90
Brougham Sedan.....	New	2,235	—
2 Pass. Sport Roadster..	1,625	1,675	50
5 Pass. Sport Phaeton..	1,675	1,725	50

DEATH OF ALEX Y. MALCOMSON

DETROIT, Aug. 1—Alex Y. Malcomson, one of the original investors in the Ford Motor Co., died in Ann Arbor this afternoon. Mr. Malcomson played a most prominent part in the early development of the automobile industry. Not only was he the first to put money into the Ford enterprise, but he also showed his faith in the future of the motor car by backing other automobile concerns in the critical period from 1900 to 1905.

Timken Completes Star Axle Contract

**Adams Axle Co., One of Durant's
Subsidiaries, Now in Pro-
duction**

NEW YORK, Aug. 1—The Timken-Detroit Axle Co. of Detroit announces that it has completed its contract with Durant Motors, Inc., having furnished the first 100,000 sets of axles used in the Star. Accompanying this statement, President Fred Glover of the axle company states that "as far as we know, Timken axles will no longer be used in the Star car."

No comment on this statement could be had at executive headquarters of Durant Motors in this city, but it is understood that for some time now the corporation's axle plant at Findlay, Ohio, has been in operation, and that already production has reached that stage where Adams axles are already going into some of the Star plants. The Adams Axle Co. is one of the subsidiaries of Durant Motors.

This announcement by the Timken-Detroit Axle Co. is interpreted by many to dissipate the rumors of a couple of years ago, when Durant Motors was formed, that parts manufacturers were back of Durant and that in reality Durant was to build and market the Star for the parts manufacturers. It was believed that four or five of the big concerns, which make important units, like engines, axles, etc., had taken this way of marketing their products.

Durant's actions for the past year, however, would seem to be at variance with this belief. At the same time he was organizing companies to build the Durant, Star, Princeton, Flint, Locomobile and Eagle, he was forming subsidiaries to make bodies, etc., including even a glass factory. The Adams Axle Co. was one of these subsidiaries. Even in the matter of engines, he had dealings with others than the concern that builds his power plants for the Star, his engines for the Durant six coming from the Ansted plant.

Ford Schedules 183,735 Production for August

DETROIT, Aug. 1—The Ford Motor Co. has laid out a schedule of 183,735 for August production, the largest month that the company plants have yet attempted. Production in the week ending Tuesday was 41,198, an increase of 268 over the previous week's record total. The high day of the week was Tuesday with 7121. Tractor production for the week was 2002. Lincoln built 208 cars.

COLUMBIA SEDAN HIGHER

DETROIT, Aug. 1—The Columbia Motor Car Co. today increased the price of its light six sedan from \$1,465 to \$1,495.

Men of the Industry and What They Are Doing

Lon R. Smith with Lubac

Lon R. Smith has been appointed general manager in charge of sales and advertising by the Lubac Corp. of Chicago. For ten years Smith was western representative of the Eisemann Magneto Co., resigning in 1916 to become sales manager of the Buda Engine Co. In 1919 he was appointed vice-president of the Midwest Engine Co., directing sales and advertising. More recently he was identified with the Bishop & Babcock Co. as consulting engineer. In his new connection he will market Lubac, a petroleum derivative intended to improve fuel combustion.

Tant Resigns Stamping's Job

Walter F. Tant, secretary and treasurer of the Michigan Stamping Co., has resigned, due to the recent consolidation with the Briggs Manufacturing Co. The resignation is effective Aug. 1. Tant has not announced his plans for the future.

Goodwin Transferred

W. H. Goodwin, manager of the Portland branch of the Ford Motor Co., has been appointed manager of the San Francisco branch.

J. D. Jordan, formerly assistant manager of the Portland branch, has been named manager.

Duttenhofer with Fox

F. A. Duttenhofer has been appointed purchasing agent of the Fox Motor Car Co. of Philadelphia, succeeding C. H. Landsittel.

Gelatt Succeeds MacMillan

P. M. Gelatt has succeeded D. G. MacMillan as president of the National Gauge & Equipment Co. of LaCrosse, Wis., making oil pressure gages, ammeters, gasoline gages, panels and other specialties. This has brought about a change among the other executives. J. M. LaVaquer now is vice-president and treasurer, P. E. Stroup, vice-president in charge of sales, J. E. Richmond, secretary and O. E. Schumacher, factory superintendent.

Griffin Reports Prize

William M. Griffin, president of the Wayne Tank & Pump Co. of Fort Wayne, Ind., has received formal notification that products of the company have been awarded a grand prize at the Brazilian Centennial Exposition, now in progress at Rio de Janeiro.

Sanderson Joins India Tire

R. M. Sanderson has become affiliated with the India Tire & Rubber Co. His connection with the industry dates back to 1893 when he started with the B. F.

Goodrich Co. After fourteen years there he was with the Miller Rubber Co. for eleven years, then becoming general superintendent of the Amazon Rubber Co.

O'Donnell Leaves A. E. A.

Edward C. O'Donnell has resigned from the merchandising department of the Automotive Equipment Association to become sales representative of the Hall Cylinder Hone Co. of Toledo, Ohio. His headquarters will be in Chicago, and his territory will be Illinois, Indiana, Wisconsin, Iowa and other middle west States.

Hall Goes With Holt

Guy H. Hall has resigned as director of the National Institute of Progressive Farming to accept the position of director of public relations for the Holt Manufacturing Co. of Peoria, Ill., maker of Holt Caterpillar tractors. His successor with the institute has not been announced.

Wishart Named Sales Supervisor

A. T. Wishart has been named district sales supervisor for Courier Motors Co., in North and South Carolina; John Shacklett in Tennessee, Alabama, Mississippi, Arkansas and Louisiana; W. L. Schweninger in West Virginia and Kentucky, and Victor L. Brogneaux, Indiana and western Kentucky.

Bradford Made Assistant Manager

Harold Bradford, formerly sales manager of the Haynes Garage at Fond du Lac, Wis., and later sales manager of the Ford assembly plant in Chicago, has been promoted to assistant manager of the Ford plant in Minneapolis.

Rubber Committee Sails

John C. Treadwell of New York will be in charge of the Caribbean Rubber Investigating Committee which sailed Wednesday for Panama.

Treadwell has been an official of the Continental Rubber Co. of New York for several years.

Hugh H. Bennett of the Bureau of Soils, Department of Agriculture, will accompany Mr. Treadwell as assistant.

Curtis R. Hill of Middleboro, Ohio, and Washington, D. C., formerly connected with the Costa Rica branch of the United Fruit Co., will accompany the party as secretarial assistant.

TOOL CONCERN BANKRUPT

MILWAUKEE, WIS., July 30—The Milwaukee Engineering & Tool Works, 70-72 West Water Street, is a voluntary bankrupt with liabilities of \$16,978 and assets of \$11,952. Unsecured claims amount to \$13,721. Walter A. Scherff is president.

Dodge Brothers Aim to Build 1000 a Day

Production to Be Increased at Once Following Completion of Plant Addition

DETROIT, Aug. 1—With the completion of a new assembly building, duplicating the present unit now used for that purpose, Dodge Brothers are aiming at an immediate production of 1000 cars daily. This represents an increase of about 200 over the peak daily production the early part of the year.

The new assembly building is the principal unit of the 1923 expansion program, other items of which are the new cyanide building, power house addition and the new closed body building. Total investment represented by the new buildings will reach \$5,000,000.

The new assembly building parallels the former building to which it is joined by overhead bridges. It is six stories high, 1000 ft. long and 75 ft. wide, with about half a million feet of floor space.

Officials would not comment on the extent of increased output that the new building would make possible other than to say the company's immediate aim will be the 1000 daily schedule. In the face of the oversold condition which the company has experienced so far this year, officials declare the additional output will be absorbed easily by the dealer organization.

The body building, which was completed in four months, is eight stories high, 400 x 200, and, joined to the former body plant, gives a floor area of over 1,000,000 ft. It will be devoted entirely to the production of all steel bodies. There are seven traveling cranes in the new building, ranging from five to twenty tons' capacity and four ten-ton high-speed elevators. All work on the new buildings was under the supervision of the company's own construction department.

Toledo Judge Approves Sale of Overland Stock

TOLEDO, July 31—Sale of Willys-Overland common stock to the Tracy syndicate was approved by Judge John M. Killets in the local Federal Court today. Tracy, who has been counsel for the receivers, applied for withdrawal as counsel, and Sigmond Sanger of Brown, Hahn & Sanger was appointed by the court in his place.

Judge Killets dissolved his former restraining order against the sale of the stock. The purchase price of \$3,000,000 is to be paid to the receiver, Francis Caffey, but will come before the local court for distribution.

Ford Purchase Plan to Be Tried Abroad

Method to Be Adapted to Meet European Economic Conditions

DETROIT, July 25—Arrangements are under way whereby the Ford Motor Co. will apply its weekly purchase plan to sales in several foreign countries, but no announcement on these will be made until the plan is definitely in operation. Representatives of the company in all countries are investigating the possibilities of increasing business by use of the plan, and as conditions are found favorable it will be employed.

General economic conditions in Europe are unfavorable at the present time, it is declared, but as these improve, and it is found possible to enlist the co-operation of banks, the different branches will make the plan available in the territories they serve. Higher prices of the cars abroad make the operation of the plan much more difficult than in this country, and this, coupled with lower wage scales, makes a broad application of it impossible.

Conditions in South America and in some of the territorial possessions are regarded as more favorable, and some districts are likely to see the purchase plan in operation in the near future. The extent to which the support of banks can be enlisted in the movement will play an important part and negotiations to this end are in progress at several points. Wherever sales can be increased by operation of the plan, and conditions are satisfactory, it will be set up.

Plan in Effect in Mexico

MEXICO CITY, July 24 (by mail)—A modified form of the Ford weekly payment plan has been put into effect here by the Cia. Importadora de Auto Universal, which, in addition to its establishment here, has branches in numerous cities throughout Mexico. Under the plan here, weekly payments are \$20 Mexican (\$10 gold) and possession of the car is given after thirty payments have been made. Because of its inability to obtain banking assistance in working out this financing method, payments are made to the company itself. In its advertising the company advises readers to make the Cia. Auto Universal their savings bank.

HIGH LABOR TURNOVER

MILWAUKEE, WIS., July 30—Judging by the experience of leading automotive manufacturers and other metal trades shops in Milwaukee during the first seven months of 1923, this year will come close to equalling the high record of 1920 in the degree of labor turnover. The percentage in 1920 was 210 per cent; in 1921, 98 per cent; in 1922, 147 per cent, and so far this year it is such

that if continued will make the yearly total over 200 per cent. The June turnover was 17 per cent.

The figures are based on twenty-five shops employing from 18,000 to 20,000 in the aggregate and were compiled by W. J. Fairbairn, manager of the Milwaukee Metal Trades and Founders' Association. He says that comparing this situation with that of other industrial lines, there is enough similarity to warrant using it as a base for general estimates of labor conditions.

Stutz to Build Its Own Six-Cylinder Power Plants

INDIANAPOLIS, July 30—The Stutz Motor Car Co. of America will build its own six-cylinder engines from now on instead of having them produced in subsidiary plants. Plans recently completed make this possible and the Stutz machine shop now is ready to produce about 10,000 six-cylinder power plants in 1924. This work will be carried on by the same force which makes the company's four-cylinder D-H engine.

This action is in keeping with the policy of Charles M. Schwab, who, following his acquiring control of the Stutz company a year ago, decided that the Stutz factory should absorb in its main plant many of these phases of production which, due to the increased activity of the plant since January 1, had to be farmed out to subsidiary organizations. Additional factory space was secured by taking over the original Stutz factory site, which was converted into storage departments for raw and unfinished stock, releasing for manufacturing work those portions of the main factory which were needed for this purpose before. With this end in view such progress has been made that the company has accomplished in seven months a task which ordinarily would take a year.

Carrying out this program, the company has turned out more finished automobiles in the first six months than it built all of last year. Retail sales, it is said, show a corresponding increase.

Court Appoints Receivers for Finance Corporation

NEW YORK, July 30—Frank A. Lord and Samuel Falk have been appointed receivers in equity under a \$50,000 bond for the Metropolitan Finance Corp., on complaint filed by five stockholders. It is alleged that the assets had been "wasted and misappropriated through the control of the corporation's affairs by Leroy Sargent, former president of the corporation, and other directors and officials elected at his instance." A denial of the allegations is made.

The Metropolitan Finance Corp. was organized in November, 1919, to extend commercial credit for the purchase of automobiles and other mortgagable commodities on the instalment plan. The capital stock consists of 100,000 shares of preferred stock and 100,000 shares of common.

G.M. Lines Up Units to Cover All Fields

New Price Arrangement Will Remove Competition Between Own Products

DETROIT, July 30—General Motors will enter upon the fall sales market with what promises to be the best price arrangement of the products of its different car units that it has known at any time in its formation. Under the new arrangement, paralleling price classes of several units which have been a rather important problem for a number of years, as setting up a form of competition within the organization, will be eliminated almost entirely, and each unit will stand hereafter in a price class by itself.

Announcement Held Up

Until the several units which are bringing out new models have placed them definitely on the market, the general price arrangement will not be publicly known, but preliminary statements indicate well marked off classes. In making the arrangement there is only one important transformation involved, the other lines remaining definitely in the price classes in which they were formerly.

By the new arrangement General Motors will cover the entire range of car prices from the Chevrolet in the low priced field to Cadillac as the high priced. Except where the closed models of a low priced line approach the open car models of the next price class above, there will be no prices that come within several hundred dollars of each other, making distinctly individual appeal to buyers in the different classes.

Aim at Price Separation

Price separation has been the aim of General Motors for a considerable period and the coming year will see the closest approach to it that the company has known. Whether several of the lines are to stay permanently in the classes now assigned to them will probably be determined by the extent of popularity they gain, but as the changes have involved the expenditures of large sums of money, it seems likely that this will be the price class arrangement for a long period.

Through the completion of several units to the Fisher Body Corp. the different General Motors units will be much better served in this important respect. Within a few weeks the Fisher unit at Pontiac will be in production exclusively for the Oakland division in adjacent factories. Chevrolet now has, or soon will have, Fisher units at each of its branch assembly plants. Buick, with its closed body branch in Detroit, is in close proximity to the many Fisher plants in this city, and Cadillac has its own body plants and the Fisher plants within easy reach.

Gramm Receivership About to Be Lifted

Reorganization Plans Being Pushed, with \$500,000 New Capital in Sight

TOLEDO, July 30—The reorganization plans for the Gramm-Bernstein Motor Truck Co., at Lima, are rapidly nearing completion, according to Receiver F. G. Kirby, of the Commerce Guardian Trust & Savings Bank, here.

The plan now considered contemplates the provision of \$500,000 of new capital, immediately lifting the receivership, and continuation of the business under virtually the same management.

Present creditors are to take preferred

stock, it is understood, and common stock of no par value will be issued to take care of present outstanding common stock.

"Inventory now is in excellent shape," said Receiver Kirby, "and the business has shown consistent earnings from month to month while the receivership has been in force."

Bank creditors and noteholders will be adequately represented on the new board of directors, it is planned, although management will remain practically as it is now.

The company was brought to Lima nearly ten years ago as the Gramm Motor Co., from Bowling Green, by B. A. Gramm, A. L. White, Max Bernstein and W. T. Agerter. After two years of operation it was sold to John N. Willys and two years later Gramm and Bernstein opened up the new company and manufactured trucks.

Brunswick Tire in Goodrich Co. Group

Manufacture and Distribution to Be Continued by the Akron Concern

CHICAGO, July 30—The tire business of the Brunswick-Balke-Collender Co. has been sold to the B. F. Goodrich Co., of Akron, O., the Brunswick people retaining a very small interest. The Brunswick tire will be continued, according to Brunswick officials, manufacture and distribution being carried on by the Goodrich company.

Brunswick tires have been manufactured in a plant at Muskegon, Mich., (Continued on page 251)

Exports, Imports and Reimports of the Automotive Industry for June of Current Year and the Totals Reported for the Last Twelve Months

	Month of June 1922		Month of June 1923		Twelve Months Ending June 30 1922			
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles, including chassis.....	8,976	\$6,652,519	14,527	\$10,130,183	52,334	\$42,899,170	119,293	\$83,841,066
Electric trucks and passenger cars.....	36	58,814	11	15,320b	156b	233,375	283	374,774
Motor trucks and buses, except electric (c)...	776	276,313	1,733	607,915b	2,727a	2,851,223	.....	.....
Up to 1-ton.....	215	230,089	316	387,456b	3,318b	1,363,163	14,144	5,062,899
Over 1 and up to 2½-ton.....	110	279,877	80	147,665b	1,021b	1,402,099	3,412	4,075,112
Over 2½-ton.....	.....	.....	.....	.....	362b	906,332	764	1,995,775
Total motor trucks and buses, except electric (c).....	1,121	786,279	2,129	1,143,036	7,428	6,522,817	18,320	11,133,786
PASSENGER CARS								
Passenger cars, except electric (c).....	.....	.....	5,231	1,925,885	13,708a	12,164,579	.....	.....
Value up to \$500 (inclusive).....	.....	.....	2,672	1,783,864b	.....	.....	28,065b	9,833,071
Value over \$500 up to \$800 (d).....	5,287	2,529,048	4,198	4,469,099b	19,635b	9,376,109	37,367	21,007,752
Value over \$800 up to \$2,000.....	2,278	2,539,677	286	792,979b	10,417b	11,542,452	32,806	34,748,857
Value over \$2,000.....	254	738,701	.....	.....	990b	3,059,838	2,452	6,742,826
Total passenger cars, except electric (c).....	7,819	5,807,426	12,387	8,977,827	44,750	36,142,978	100,690	72,332,506
PARTS, ETC.								
Parts, except engines and tires*.....	18,661,613	4,089,802	.....	.....	33,921,767e	79,316,512e	18,618,812	.....
Automobile unit assemblies*.....	.....	3,060,466	.....	511,359	.....	17,978,641b	2,806,675	.....
Accessories, parts of*.....	.....	17,285,074	.....	4,087,851	.....	118,407,758b	26,768,257	.....
Automobile service appliances*.....	.....	187,934	.....	92,560	.....	625,735b	342,982	.....
Station and warehouse motor trucks (No.)...	17	14,532	21	9,517	158	165,378	152	89,704
Trailers.....	33	15,403	61	27,582b	266b	119,428	893	363,169
Airplanes.....	.....	.....	5	4,500	43	150,995	39	355,530
Parts of airplanes, except engines and tires*.....	29,545	12,242	9,681	3,310	.....	96,440	438,315	235,761
BICYCLES, ETC.								
Bicycles and tricycles (No.).....	1,368	12,056	1,948	14,606	.....	481,034	23,993	182,644
Motor cycles.....	1,973	506,174	1,833	418,258	11,512	3,080,685	19,608	4,604,612
Parts, except tires*.....	304,985	155,865	292,853	154,085b	1,705,023b	914,590	2,906,940	1,518,883
INTERNAL COMBUSTION ENGINES								
Stationary and Portable Engines—	59	8,248	15	66,056b	108b	47,409	935	472,720
Diesel and semi-Diesel (No.).....	2,609	402,158	3,583	571,290	17,620	2,686,531e	14,729e	1,781,589
Other stationary and portable.....	.....	.....	193	92,273	.....	.....	14,925b	1,461,938
Not over 8 hp.....	.....	.....	.....	.....	.....	.....	836b	469,786
Over 8 hp.....	8,852	831,401	444	39,745	33,602	3,955,569e	15,619e	1,910,857
Automobile engines.....	.....	.....	3,214	393,687	.....	.....	2,679b	303,602
For motor trucks and buses.....	.....	.....	180	55,104	.....	.....	24,610b	2,945,197
For passenger cars.....	.....	.....	10	7,060b	90b	48,329	77	45,517
Engines for tractors.....	27	19,000	.....	.....	.....	.....	878b	197,210
Engines for aircraft.....	.....	.....	.....	.....	.....	.....	.....	.....
Engine accessories and parts for*.....	611,545	225,582	819,505	337,968b	3,445,902b	1,342,353	7,111,674	3,013,225
All other engines and parts of.....	.....	.....	.....	.....	.....	3,940,067	.....	.....
IMPORTS								
Automobiles and chassis.....	33	39,656	116	123,820	450	757,269	624	925,673
Other vehicles and parts.....	.....	52,963	.....	209,771	.....	871,563	.....	1,381,474
REIMPORTS								
Amount of duty collected.....	.....	.....	.....	.....	.....	.....	.....	a208,152
Automobiles free of duty.....	121	191,654	50	74,834	2,762	4,345,686	3,212	3,909,513

a Beginning Sept. 22.

Henry Ford Pushing Export Development

New Plant at Philadelphia Starting Wedge in Expansion of Foreign Business

PHILADELPHIA, July 28—More definite plans for the Ford Motor Co.'s new plant, to be built here at Sixty-third Street and the Schuylkill River, are now awaited in this city from Henry Ford and Edsel Ford. The tract of 100 acres purchased as a site for the structure is owned by Richard De Cou and Richard Lloyd, who bought it several years ago for \$250,000.

The Lloyd tract consists of thirty-two acres, for which about \$176,000 is expected to be paid, making a total cost of \$426,000 for the tract, or an average of \$6,000 an acre. The combined tract has a frontage of about 800 ft. on a depth of about 30 ft. of water on the Schuylkill River. The rear of the tract lies along the Pennsylvania Railroad. It is known that the Ford company intends to spend several million dollars on buildings, wharves and railroad facilities.

The Ford company is looking forward in the next few years to a greatly expanded export business, which, it is now reported, may be handled through Philadelphia and Norfolk. The site offers great possibilities for industrial development, and the plant will employ

upward of 2000 men. The company has just paid \$132,000 for the site of its new plant at Norfolk, which development is expected to cost about \$1,500,000. The company is considering making it a branch of the export department of the business.

A new development in the local situation is that Henry Ford has arranged to construct a dock at Glassmere, near Franklin, Pa., for shipping down the Allegheny River the products of the plate glass works near Tarentum, Pa., according to L. I. Livingston, secretary of the Lake Erie-Allegheny River Canal Association, who received word from Detroit to this effect. Ford's interest in the waterway, it is said, has lent impetus to the movement to have the whole river canalized and connected with Lake Erie.

Industry's Critics Flayed by Erskine

(Continued from page 240)

President Erskine also reports that payments under the plant expansion program and current betterments of the corporation to the extent of \$3,022,967 has been made out of profits during the six months and \$650,000 of preferred stock also was retired. The cash position of the corporation has been increased and inventories decreased, despite the increased volume of operations. Plans for the third quarter call for the production of 41,000 cars.

Change in Details Mark New Dodge Line

Wheelbase Increased, Springs Lengthened and Bodies Refined —Basic Units Retained

DETROIT, Aug. 1—Longer, lower lines characterize the appearance of the new models which have just been announced by Dodge Brothers. While the same basic units have been retained, 55-in. semi-elliptic springs have replaced the 45-in. three-quarter elliptic suspension at the rear. The wheelbase has been increased from 114 to 116 in.

Other than the changes listed above, detailed refinement is marked throughout the entire line. The bodies are lower, and the depth of the seat cushions have been increased, the additional length of wheelbase having gone into greater leg room in both front and rear seats. Consequently the hand levers are at a greater distance forward of the front seat. The steering gear has been improved in appearance and the column is now tilted at a greater angle. The instruments have been assembled on a raised panel at the center of the instrument board. A Yale lock has been built into the transmission. The leverage of the clutch pedal has been greatly increased and pedal pads enlarged.

Better Steering Qualities

While the same engine, transmission and rear axle are continued, the chamber of the front wheels is increased for greater ease of steering, and the front springs are slightly longer and are built up of an increased number of thinner leaves, which have been increased from 1½ to 2 in. width. Semi-elliptic springs of 55-in. length supplant the former three-quarter elliptic design. Louvres have been added in the side panels of the hood to promote the egress of heated air from the engine.

All steel construction is now to be found in all types of bodies, including touring, roadster, coupé, business sedan, type A sedan and the ¾-ton commercial bodies of screen and panel type sides. The rear seat and all the upholstery of the phaeton are removable, affording large luggage space. The type A sedan is finished in mohair velvet, while the business sedan and the coupé are finished in blue Spanish leather.

New type of headlights are now used, and a stop signal is combined with the tail lamp. The switch lever on the dash has been lengthened to facilitate operation while driving.

Prices of the new line are as follows:

Phaeton	\$ 880
Roadster	850
B Sedan	1,250
A Sedan	1,385
Coupe	1,035
Screen side delivery	895
Panel delivery	995
Chassis	730

Studebaker Corp. Comparative Profit and Loss Table

	1923		1922	
	2d quarter	1st 6 mos.	2d quarter	1st 6 mos.
Cars produced	43,346	80,855	31,362	58,027
Cars sold	42,680	81,891	37,252	60,053
Net sales	\$49,370,091	\$92,648,545	\$45,606,044	\$73,422,862
Net profits, before taxes	\$8,174,328	\$15,259,783	\$8,110,926	\$12,686,763
Less reserve for income taxes	974,126	1,888,609	1,024,374	1,530,363
Net profits all sources	\$7,200,202	\$13,371,174	\$7,086,552	\$11,156,401

The consolidated balance sheet is as follows:

ASSETS	June 30 1923	Dec. 31 1922
Cash	\$18,426,295.12	\$15,174,395.91
Sight drafts outstanding	4,867,264.90	3,509,864.95
Investments	3,327,201.42	4,017,990.95
Net receivables (less reserves)	7,213,364.50	4,859,578.62
Inventories	20,956,192.06	21,514,248.93
Deferred charges	365,599.21	761,323.16
Quick assets	\$55,155,917.21	\$49,837,402.52
Plants and property	45,990,440.79	43,426,181.99
Housing development	1,539,107.20	1,559,927.82
Trade name and goodwill	19,807,276.64	19,807,276.64
Totals	\$122,492,741.84	\$114,630,788.97
LIABILITIES		
Accounts payable—current	\$6,393,477.36	\$6,756,635.09
Reserves for taxes	4,440,066.98	3,418,695.81
Reserves—dealer's discount and deposits	2,499,799.28	1,923,450.74
Other payable reserves	1,748,713.22	3,389,817.82
All liabilities	\$15,072,056.84	\$15,488,599.46
Preferred stock	8,800,000.00	9,450,000.00
Common stock	75,000,000.00	75,000,000.00
Special surplus	4,455,000.00	4,455,000.00
Surplus	19,165,685.00	10,237,189.51
Totals	\$122,492,741.84	\$114,630,788.97

Goodrich Makes Big Gain in Six Months

Earnings Best Since War—Production Rate on Steady Basis

AKRON, OHIO, July 30—The B. F. Goodrich Co., in its report of financial conditions for the first six months of the current year, reveals an improvement of fully 100 per cent over earning capacity of the first six months of 1922, reporting net income for the first six months of 1923 of \$5,546,004 on sales of \$54,074,004. After allowance for depreciation and payment of interest, the company reports a net of \$3,006,384, before dividends, carried to surplus.

Not considering the preferred stock, this indicates earnings of approximately \$5 a share on common stock for the first half of the year—or more than was earned on common stock during all of 1922. This is the company's best showing since the war, and in all probability means an early resumption of dividends, although officials will not commit themselves upon this.

The company shows an excellent ratio of current assets to current liabilities, reporting current assets of \$53,047,211, including \$3,731,757 in cash, as compared to \$16,833,544 in current liabilities.

The Goodrich semi-annual statement of assets and liabilities as just issued is:

ASSETS

Cash, \$3,731,757; Liberty bonds, \$15,127; trade notes, \$18,660,660; other receivables, \$313,533; inventories, \$30,326,191; due on employees' stock, \$913,107; preferred stock, (14,564 shares) \$1,456,400; investments, \$4,988,311; plant equipment, \$31,288,215; and deferred, \$3,355,021. Total, \$95,048,268.

LIABILITIES

Notes payable, \$13,073,356; accounts payable, \$3,228,882; sundries, \$536,500; first mortgage bonds, \$23,887,500; reserves, \$1,539,588; preferred stock, \$36,036,000; common exclusive of \$57,798,001 good will, \$7,313,990; surplus appropriated for war amortizations, \$1,225,003; earned surplus, \$12,699,360; employees' net credits, \$513,212. Total, \$95,048,268.

General Motors Has Its Best Half Year

(Continued from page 240)

As of May 1, 1923, the corporation exercised its right to subscribe to 60,080 shares of common stock of the Fisher Body Corp., paying therefor \$4,506,000 in cash. On May 31 the corporation anticipated payment of the remaining Fisher Body purchase money note of \$1,000,000 due Aug. 1, 1923, thus completing the payment of the \$23,840,000 purchase of 60 per cent of the stock of the Fisher Body Corp.

DROUGHT MAY AFFECT SALES

DES MOINES, IOWA, July 28—Automobile men of Iowa are regarding with concern the continued dry weather of the last few weeks. Although there has been no noticeable slowing-up of the au-

SEMI-ANNUAL STATEMENT OF GENERAL MOTORS CORP. AND SUBSIDIARY COMPANIES

Condensed Comparative Consolidated Balance Sheet as of June 30, 1923, and Dec. 31, 1922.

ASSETS		June 30, 1923	Dec. 31, 1922
CURRENT AND WORKING ASSETS:			
Cash in banks and on hand.....	\$ 56,055,248.60	\$ 27,872,722.92	
United States Government Bonds.....		3,950.00	
Marketable securities.....	18,286.60	29,618.10	
Sight drafts against B/L attached and C. O. D.....	10,220,439.84	13,179,664.05	
Notes receivable.....	5,232,226.26	4,455,042.33	
Accounts receivable and trade acceptances, less reserve for doubtful accounts (In 1923, \$1,651,317.17; in 1922, \$1,431,143.55).....	18,130,000.42	15,921,934.93	
Inventories at cost or market, whichever is lower.....	114,725,627.52	117,417,823.05	
Prepaid expenses.....	1,014,925.05	1,358,404.98	
TOTAL CURRENT AND WORKING ASSETS.....	\$205,396,754.29	\$180,239,160.36	
FIXED ASSETS:			
Investments in allied and accessory companies, etc.....	\$ 61,135,257.99	\$ 57,293,864.72	
General Motors Corporation common and debenture stock held in treasury.....	4,193,169.16	3,275,432.65	
Real estate, plants and equipment.....	264,394,133.86	255,207,970.82	
Deferred expenses.....	6,713,050.40	3,947,794.49	
Goodwill, patents, copyrights, etc.....	22,440,811.06	22,370,811.06	
TOTAL FIXED ASSETS.....	\$358,876,422.47	\$342,095,873.74	
TOTAL ASSETS.....	\$564,273,176.76	\$522,335,034.10	
LIABILITIES, RESERVES AND CAPITAL		June 30, 1923	Dec. 31, 1922
CURRENT LIABILITIES:			
Accounts payable.....	\$ 30,657,255.30	\$ 34,812,441.20	
Notes payable.....			
Taxes, payrolls and sundries accrued not due.....	22,623,448.60	16,166,563.70	
Federal taxes payable during 1923.....	780,193.74	1,650,821.93	
Accrued dividends on preferred and debenture stock..	1,139,644.53	1,133,096.23	
TOTAL CURRENT LIABILITIES.....	\$ 55,200,542.17	\$ 53,762,923.06	
Purchase money mortgages.....	\$ 905,399.64	\$ 1,279,750.12	
Purchase money notes, account Fisher Body Corporation stock purchase.....		1,000,000.00	
	\$ 905,399.64	\$ 2,279,750.12	
RESERVES:			
Depreciation of real estate, plants and equipment.....	\$ 57,224,155.00	\$ 50,827,907.11	
Employees' investment fund.....	732,462.50	1,143,962.50	
Federal taxes in respect to 1923 earnings.....	5,483,000.00		
Sundry contingencies.....	8,866,961.74	7,016,667.35	
Bonus to employees.....	2,632,101.18	1,344,098.70	
TOTAL RESERVES.....	\$ 74,938,680.42	\$ 60,332,635.66	
CAPITAL STOCK:			
Debenture stock 7%.....	\$ 32,181,600.00	\$ 32,181,600.00	
Debenture stock 6%.....	60,801,000.00	60,801,000.00	
Preferred stock 6%.....	16,183,400.00	16,183,400.00	
Common stock, no par value:			
20,646,327 shares issued and outstanding at \$10.00 per share.....	206,463,270.00	205,577,500.00	
Common stock (\$100 par value).....	700.00	700.00	
TOTAL CAPITAL STOCK.....	\$315,629,970.00	\$314,744,200.00	
Interest of minority stockholders in subsidiary companies with respect to capital and surplus.....	1,399,986.05	1,278,662.18	
SURPLUS over and above \$10.00 per share of no par value common stock.....	116,198,598.48	89,936,863.08	
TOTAL CAPITAL STOCK AND SURPLUS.....	\$433,228,554.53	\$405,959,725.26	
TOTAL LIABILITIES, RESERVES AND CAPITAL....	\$564,273,176.76	\$522,335,034.10	

*The payment of the Fisher Body Corporation note due Aug. 1, 1923, was anticipated.

tomobile business as a result of the drought, a continuation of the intense heat and dry weather may so affect the crops as to cause a decreased demand for automotive products in the State.

Corn growth has been halted over at least nine-tenths of the State by lack of moisture. As the corn crop is at the most critical period of its growth, even a short continuation of the dry weather may greatly reduce the yield. Pastures over the State have dried up so that it has been necessary in some cases to place live stock on feed. Truck crops, potatoes and berries are also suffering from the heat and drought.

Earl Creditors' Claims Sold to Chicago Brokers

DETROIT, Aug. 2—It is reported here that Briggs & Turivas, Chicago brokers, have purchased the claims of creditors of the Earl Motors Corp. Officials of the Earl corporation are of the opinion that the Chicago brokers, in taking over the claims of the Chicago bank interests, are acting as intermediaries for another automobile manufacturing company, which plans to take over the plant and manufacture cars either under the Earl or another name.

Receiver Appointed for Weidely Motors

Temporary Protection Sought to
Enable Tiding Over of
Financial Affairs

INDIANAPOLIS, July 30—William H. Fletcher, former secretary of the Weidely Motors, has been appointed receiver for the Weidely Motors Co. by Judge Harry O. Chamberlin, of this city, in a friendly receivership suit brought by William A. Umphrey, treasurer and general manager of the company. He asked judgment of \$1,500 against the company and asked that a receiver be appointed to temporarily protect the company business to enable it to tide over financial affairs. In his petition, Umphrey said the company was solvent, but did not have sufficient cash to meet its obligations, due to recent orders from customers to hold up shipments of engines until new releases had been given.

Umphrey declares the company has orders for 3,000 gasoline engines and has stock to build at least a third of these ordered engines. The orders, it is understood, have not been cancelled but deliveries are merely held up by customers until such time as they supply new releases. The customers had given sudden notice since July first that they had more engines than they needed, and stopped shipment. This notice left the motor company with 100 completed engines and materials for another thousand on hand. Had the company been given the contractual sixty-day notice by its customers the materials could have been liquidated. The receivership, it is said, will tide the company over until the automobile companies can take the balance of their contracted orders.

Creditors Owed \$238,000

Assets of the company amount to \$1,270,940 with liabilities of \$851,924. Merchandise creditors are owed about \$238,000. Since January 1 the company has built more than one million dollars' worth of engines.

Truman C. Rapp is president, George Weidely, vice-president and William P. Fletcher has been secretary for several years to May 1, when he resigned. He brings ripe experience to the receiver's work.

In no statement by Weidely Motor's officials has the name of any customers been quoted. Officials maintain, however, that the contracts of the company to supply engines to automobile makers have not been cancelled, but that deliveries will be accepted by the customer as soon as the market demand permits the car makers to go ahead with production.

STEEL SALES CONCERN FORMED

CHICAGO, Aug. 1—The Surplus Steel and Iron Co. has been organized, with offices at 327 South LaSalle Street, Chi-

"NO PARKING" SIGNS VIOLATE ORDINANCE

NEW YORK, July 30—Joseph Johnson, Commissioner of Public Works of Manhattan, has ruled that property owners who paint on the sidewalk in front of their premises the warning "No Parking Here" are violating a provision of the Code of Ordinances which says: "No person shall deface any sidewalk by painting or writing thereon, or attaching thereto, in any manner, any advertisement or other printed matter."

cago, to act as agent for the sale of surplus steel and iron stocks, including automobile materials and machinery. The business will be handled on a commission basis, and no materials will be purchased for resale. The manager is F. X. Devlin, formerly purchasing agent for the Federal Motor Truck Co. and later serving in similar capacity for the Elgin Motor Car Corp.

Chandler to Distribute \$200,000 in Bonus Form

CLEVELAND, July 28—Employees of the Chandler Motor Co. will receive approximately \$200,000 in the form of an annual bonus for service. The distribution, which is the eighth annual one, is being made this week.

Bonus checks that are going out to the employees from the general offices range from \$50 to \$700, according to George M. Graham, vice-president and general manager. All workers except those holding executive positions share in the bonus. Each employee will receive from 10 to 13 per cent. of his year's wages, the highest percentage going to those who have been with the company for more than three years.

Several who have held important posts in the Chandler organization for several years will receive about \$700 each.

Stockholders of Winther Motors to Bid in Assets

KENOSHA, WIS., July 30—Stockholders in the bankrupt Winther Motors, Inc., Kenosha, Wis., have agreed to pay a small assessment to create a fund sufficient to bid in the assets when offered at receiver's sale early in August, and form a new corporation with \$500,000 capital to resume the operation. The bankruptcy petition filed Feb. 10 gave assets at \$1,038,722 and liabilities at \$655,034. Edward C. Kraemer, of Milwaukee, secretary of the stockholders' reorganization committee, has held meetings in twenty-five cities in Wisconsin to reach the largest possible percentage of holders, who are mostly Wisconsin people, and the plan has been given almost universal approval. The concern was capitalized at \$4,200,000.

Big Concrete Track Planned by French

Construction to Be Finished Next
Spring—Would Stage
Grand Prix

PARIS, July 17 (by mail)—The first French automobile race track, construction of which will begin in a few days, will be ready for competition next Easter, declares E. Bablot, the ex-race driver responsible for the scheme. The French track will be built 30 miles from Marseilles and will be of armored concrete construction, 3.1 miles round. There will be two parallel straightaways measuring 1,366 yds., united by banked turns. Width of the track will be 53 ft. At the end of the straightaway there will be a transverse stretch, entered by right angle turns, to be made use of for events in which it is desired to test brakes and powers of acceleration. Inside the main track there will be a horse track rather less than 2 miles round. The cost of the Marseilles track is estimated at 7,500,000 francs.

It is intended to open the track on Easter Monday, 1924, with a big stock car race. If the French Grand Prix race is not held on this track the intention of the organizers is to stage a big 122 cu. in. race in the fall, and to make an appeal to American race drivers by putting up a cash first prize of 100,000 francs. The date will be selected so that drivers from across the water can take part in both this and the Italian track race at Monza, for which cash prizes are also offered.

Deputy Barthelemy has introduced a proposal to the French Chamber of Deputies authorizing the Government to construct an automobile race track in the neighborhood of Paris in order to put French automobile manufacturers on an equal footing with British, Italian and American firms. The proposal is that the State should advance the capital and farm the track out to a company which would undertake to exploit it under Government control.

DAFOE-EUSTIS REORGANIZED

DETROIT, July 30—Recently incorporated for \$100,000, the Dafoe-Eustis Co. of this city has undergone a reorganization that has brought new blood into the concern, which will push Ustus products, which include tire covers, side curtains, pedal mats, cushions and other fabric and leather goods used in the automotive industry.

As revised, the personnel of the officers include Bert M. Eustis as president; James E. Morrison, first vice-president; Alfred K. Hebner, second vice-president; Kenneth H. MacQueen, secretary and treasurer, and Richard C. Rau, comptroller. Eustis also is general manager, with MacQueen as his assistant. Howard M. Brophy is purchasing agent and Edward C. Best, factory manager.

French Plane Wins Fuel Economy Prize

**Breaks Record by Flying 186
Miles on 5.8 Gals. of
Gasoline**

PARIS, July 17—(by mail)—In winning the 100,000 francs prize offered by the Petit Parisien for the fastest flying machine capable of covering 186 miles with an allowance of 5.8 gallons of gasoline and oil, Lucien Coupet proved the economy of travel by air, for his fuel bill amounted to \$1.16 at present exchange, with gas bought on the French market. Coupet piloted a Farman monoplane practically identical with the one which has been used in all the big glider competitions of the past year, and to which a Salmson 3-cylinder air-cooled engine of 122 in. piston displacement had been added.

193 Miles Covered

He landed after covering 193 miles, or seven more than required under the rules, in 4 hrs. 47 min. 19 sec., giving an average speed of 40.1 m.p.h. He then had 2 1/10 gals. of gasoline in his tank, or sufficient to remain aloft for two more hours. He came down, however, because no other competitors remained of the seven who had started in the final, and there was nothing to be gained by remaining aloft.

After elimination events comprising altitude of 1640 ft. in 30 min. the final 186 mile speed test united seven starters, comprising three Farmans, three Dewoitines, one of which was piloted by Barbot, and a Breguet. On the morning of the race the heat wave gave way to heavy rainstorms with occasional squalls of wind. Because of the excessive heat two of the Farmans had had aluminum housings with air scoops built around the engines. The weather transformed these air scoops into water scoops and put Bossoutrot and Drouhin out of business with flooded valves and plugs after covering a very short distance. Coupet had his engine in the nose of the plane, without any protecting housing and rain was driven off it by the propeller slip stream. The Dewoitines, with the same type of engine as the Farmans, ran out of gasoline before covering the minimum distance. When forced down after 167 miles, Barbot's Dewoitine had a higher average speed to its credit than the winning Farman, namely 47 m.p.h., and was awarded the second prize of 20,000 francs.

Winner Used Monoplane

The competition was open to only French-built planes and engines, with a maximum weight limit of 551 lbs. in flying order, pilot aboard. The amount of fuel for the distance of 186 miles was 44 lbs., this comprising both gasoline and oil. Several of the competitors failed under the weight limit, and others objected to the clause forbidding a land-

ing after the official start had been taken.

The winning Farman is a monoplane of 34 1/2 ft. wing spread, total surface 161 sq. ft., length 18 1/2 ft., and height 6 ft. 5 in. It is fitted with a Salmson air-cooled three-cylinder Y-type engine, of 70 by 85 mm. bore and stroke, developing 12 hp. at 1800 r.p.m. and giving 16 hp. at the maximum engine speed of 2400 r.p.m. The propeller is mounted direct, but on the other Farman machines a geared down propeller was used with better efficiency. With the engine, but with all tanks empty, the weight of the plane is 220 lbs. The pilot weighed 154 lbs.

Brunswick Tire in Goodrich Co. Group

(Continued from page 247)

but under Goodrich management manufacturing will be moved to Akron and the Brunswick company will use the Muskegon plant for phonograph and record making. Brunswick tire production has averaged about 2000 casings a day.

This announcement follows the formation of the Brunswick Tire Co. a couple of weeks ago, it being stated then that it would act as a subsidiary of the Brunswick-Balke-Collender Co., which for years has been engaged in the manufacture of billiard equipment and bowling alley supplies, and continue the Brunswick tire business.

STRANAHAN FORMS COMPANY

PARIS, July 30—As the result of the visit of Robert A. Stranahan, president of the Champion Spark Plug Co. of Toledo, Ohio, to France, an incorporated company has been formed under French laws to be known as the Société des Agences Françaises de la Champion Spark Plug Co., with a capital of 250,000 francs, and registered offices at 27 Rue Quentin-Bauchart, Paris. The company will handle spark plug and accessory business through dealers. The board of directors consists of Robert A. Stranahan of Toledo, Emile Bourgeois of Paris, Robert Lydy of London, Benjamin H. Connor of Paris and Frank D. Stranahan of Toledo.

Supercharger Lost Race for Fiat Team

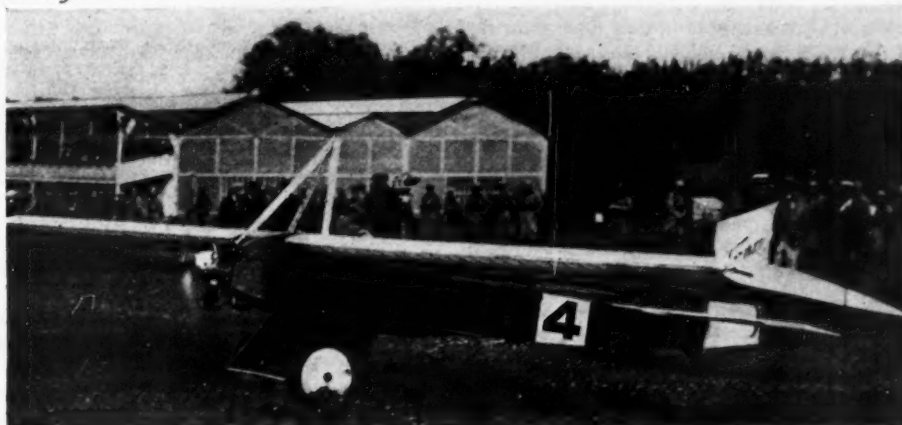
**Device Not Able to Function
Properly on Dusty
Track**

PARIS, July 17—"We are beaten and that is all there is to it," is the only statement the Fiat directors will make on the failure of their cars to finish in the recent French Grand Prix race. Since the racing cars were returned to the factory, however, it has been possible to ascertain the real facts regarding their elimination in the 500-mile road race.

The use of a supercharger on a dusty road, the surface of which had begun to break up before the race started, was the cause of the undoing of all three cars. All the air was taken in around the base of the radiator and delivered under pressure to the carburetor through an air passage cast inside the base-chamber. Mordino went out first when very serious damage had been done to his blower by stones getting in it.

Giaccone's withdrawal was supposed to be caused by a broken valve. An examination of the engine showed that so much grit and dust had been driven into the engine that the valve facings and seats had been ruined. Salamano's sensational withdrawal, when thirty miles from the end and with a ten minutes' lead, which at the time was supposed to be due to a punctured gasoline tank, is now discovered to have been caused by grit and dust in the engine. Spluttering and misfiring because the valves were not seating, Salamano, in the excitement of the race, diagnosed this as gasoline shortage and sent his mechanic off for a fresh supply.

Before coming to France the supercharger Fiats had only been run on Monza track or on roads free from dust, when no trouble developed. The device itself has given complete satisfaction, adding 20 effective horsepower to the engine. The French race has shown, however, that to be practical there must be adequate protection against road dust.



Farman plane with 122-in. engine which won a prize of 100,000 francs, averaging 40 m.p.h. for 193 miles at a fuel cost of \$1.16

National Reports New Finance Plan

Earl Declares Program Operative to Put Concern on Pro- duction Basis

CHICAGO, July 28—A plan to finance the National Motors Corp. and put it on a production basis has been declared operative as of this date by Clarence A. Earl, president of the corporation.

Creditors were asked to accept for their claims debenture notes of an issue not exceeding \$3,000,000, due on or before July 1, 1925. Enough of the creditors have accepted this plan to make it operative, according to the announcement.

A Revolving Fund Corporation is to be created to which will be transferred \$300,000 from the proceeds of present inventories and to which is to be added \$1,500,000 from the sale of \$10,000,000 of Series A no-par value common stock, sale of which certain brokers are said to have contracted to underwrite provided the foregoing plans are made effective.

This capital stock is to be in a direct subsidiary organized for the purpose of providing working capital for the corporation, the balance of \$8,500,000, after creation of the revolving fund, to be available over a period of two years for working capital.

Fund to Purchase Materials

The Revolving Fund Corporation is to make all purchases of materials, paying cash, and is to pay for all labor incident to assembling the material into finished product. Proceeds from sale of finished product are to be applied first to repayment of advances made by the revolving fund, and the remainder divided among present creditors under a general plan.

An arrangement was made for the funding for a period of five years of obligations aggregating \$5,103,100 which otherwise would have had to be paid in cash. These items include \$500,000 yearly sinking fund for series A and B bonds, provision for which has been waived by holders; \$637,500 interest coupons on collateral trust gold notes due prior to July 1, 1925; \$1,965,600 collateral trust gold notes, disposed of through cancellation of agreement to repurchase prior to maturity.

Inventories and receivables of approximately \$7,122,000 are to be pledged to secure interest on series A bonds and taxes for one year, approximating \$350,000, and \$2,700,000 collateral trust gold notes and the new issue of not more than \$3,000,000 debenture notes.

National Production at Louisville

LOUISVILLE, July 30—Robert V. Board, head of the local unit, formerly the Kentucky Wagon Manufacturing Co., of National Motors, Inc., has received notice from C. A. Earl, president of the company, that the plan is now operative,

centralizing the control of the nine units at the general offices in Chicago, providing for placing the company on a sound financial basis and starting production activities.

The local plant, according to Board, is working 500 mechanics at the present time, and this number will be increased to about 1200 by the end of the year and to a peak of probably 1500 by the middle of 1924. Present production of National automobiles here is averaging five cars a day, Board said, whereas the peak production when the organization is functioning smoothly at capacity will be around 100 cars daily.

The Louisville unit, Board said, has been producing cars for more than three months. Practically half of the finished car is being made here, such as bodies, upholstering, etc.

FINANCIAL NOTES

Ajax Rubber Co., Inc., for the six months ended June 30 reports net profits of \$414,720 after taxes and interest; also reserves for depreciation and readjustment of inventory. Net profits in the first half of 1922 were \$191,536 after taxes and depreciation. Sales for the second quarter of this year were practically 90 per cent of the first quarter, resulting in an increase for the six months' period of 1923 of 61 per cent, as compared with the same period last year.

Pierce-Arrow Motor Car Co. reports net earnings of \$526,456 for the three months ended June 30 after deducting all expenses of operations. This compares with \$430,527 in the first three months of the year. After charges for interest and other deductions there was reported a net income for the period of \$162,842, against \$105,057 in the first three months.

Timken Roller Bearing Co. has declared an extra dividend of 25 cents a share on the capital stock in addition to the regular quarterly payment of 75 cents a share. Both dividends are payable Sept. 5 to stockholders of record Aug. 20. The company reports earnings of \$4,554,301 for the six months ended June 30 after taxes and depreciation charges.

Gray & Davis Co. for the first six months reports net sales of \$2,455,338, against \$1,579,582 in the same period last year. Net profits were \$158,050 after taxes, interest and depreciation, but before dividends. After allowing for the preferred dividends, the balance of \$128,050 was available for the common at 95 cents a share.

General Motors Acceptance Corp., a General Motors subsidiary, has issued a statement as of June 30 last showing total resources of \$74,233,002; cash, \$6,205,919; notes receivable, \$479,623; accounts payable, \$248,970; notes payable, \$57,640,196, and surplus and undivided profits, \$2,443,147.

NEW LOGAN GEAR PLANT

TOLEDO, Aug. 1—Sale of the former Modern Glass Co. plant to stockholders for \$150,000 also was approved by the court. It will be turned over to the Kaufman Metal Products Co. of Bellefontaine as a new branch plant for manufacture of Logan gears. It is expected 300 men will be placed at work in two months. Machinery will be installed during that period.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Quiet and unsettled markets still prevail, reflecting the uncertain outlook for fall business.

Crop reports on the whole were somewhat less favorable last week, due to drought in some corn and cotton regions. However, the downward movement in the cotton market continued. Prices quoted last week for cotton goods were said to be based on 17-18c raw cotton, discounting anticipated further price declines. Further curtailment of production by northern and southern mills is reported.

Buying of iron and steel has been increased somewhat. Some of the largest companies report that new bookings are keeping pace with shipments for the first time in several months.

Commodity prices are still irregular, but there are evidences of increased strength. Bradstreet's food index for the week ended July 26 remained unchanged at \$3.11, while Professor Fisher's index of wholesale prices for the week ended July 28 rose from 153 to 154—the first rise recorded since the early part of April.

A "practical cessation of wage rate increases" in New York State factories is reported for June, the number of workers affected by increases being only one-sixth as many as in May. The sharp drop in the number of wage increases followed an uninterrupted rise for a year.

Car loadings during the week ended July 14 totaled 1,019,667, only 2103 less than the record figure for the week of June 30, and 19,026 more than in the corresponding week of 1922. Incomplete reports of railroad earnings for June show a large gain over last year.

Discounts by the Federal Reserve banks declined \$45,300,000 during the week ended July 25. Of this amount \$44,100,000 represents a liquidation of loans secured by United States Government obligations. Federal Reserve notes in circulation increased \$22,100,000, while deposits dropped \$45,900,000, the latter decline being almost entirely in member banks' reserve balances. There was a gain of \$16,600,000 in reserves, bringing the reserve ratio up from 76.5 to 78.2 per cent.

Loans of reporting member banks declined \$91,000,000 during the week ended July 18, the bulk of the decrease being in loans secured by stocks and bonds. A drop of \$25,000,000 in Government obligations was offset by an equal gain in holdings of other securities. The reserve balances with Federal Reserve banks declined \$25,000,000 and cash in vaults \$2,000,000. The largest single change was the drop of \$118,000,000 in net demand deposits. Accommodation at Federal Reserve banks fell off \$38,000,000.

Time money rates remained at 5 to 5½ per cent, while call loans, after ranging from 4½ to 5 per cent last week, touched 6 per cent on Monday.

Warehousemen Want Uniform Truck Law

Will Ally Themselves with Auto- motive Industry to Secure Desired Legislation

DETROIT, July 30—Aversion to making too heavy investments in motor truck equipment for long distance transport was expressed by members of the National Furniture Warehousemen's Association at the organization's recent convention at Mackinac Island, Mich.

In support of this policy of caution, the association adopted a motion under which the committee on inter-city long distance removals, headed by W. Lee Cotter, an Ohio storage executive, will draft a uniform law for presentation to the various State Legislatures. After the Warehousemen's association has approved the text at its coming winter convention, the committee will take the proposed bill before the Commissioners on Uniform State Law for approval.

Discussion at the warehousing convention indicated that it is not improbable that the suggested bill may be worked out in the form of a "compromise" measure in conference with the national electric railway interests. The truck transport regulation bill, which is being sponsored by the electric railway interests, was criticized at the Mackinac Island convention as being unfair in many respects to the public storage industry, but convention discussion led to expression of opinion that the warehousing industry, rather than oppose State regulation of any kind, ought to work hand in hand with the electric railway interests in an effort to have enacted legislation which would be satisfactory to and equitable to all.

To Side With Automotive Industry

It was predicted at the warehousing convention that the steam railroads and the electric railways would not, without a struggle, surrender to the warehousing trucking interests the business of transporting furniture and household goods. Speakers expressed opinion that the time had come when warehousing as an industry must throw its support either with the carriers or with the automotive industry, and a motion was adopted that warehousing should side with the automotive interests.

The problem of long distance hauling by motor truck was declared to be a vital one for warehousing, and it was predicted that same day the National Furniture Warehousemen's Association would form a long distance removals company of its own on a cooperative basis. Such a company is now being organized locally by N. F. W. A. members in St. Louis and down-State Illinois.

In considering the organizing of such a company on a national basis, the N. F. W. A. plans to analyze conditions as they pertain to:

- 1—Possible volume of business to be obtained within certain defined areas, segregated as between received and forwarded business; in other words, the volume of pay load miles.
- 2—Cost of doing business.
- 3—Charge for this service.
- 4—Comparison of charge with railroad rates.
- 5—Competitive conditions.
- 6—Organization and connections required to carry on this work.
- 7—Equipment required to carry on the work efficiently.

The rate committee presented a "Long Distance Moving Base Rate Table," designed to enable warehousemen to figure out what charges they should prefer for hauling household goods by truck over distances ranging from 15 to 100 miles.

INDUSTRIAL NOTES

Goodyear Tire & Rubber Co. has leased a plot 100 x 250 on the southwest corner of Eleventh Avenue and Fifty-eighth Street, New York City, and will erect thereon a six-story building. The company will consolidate in the new building its salesroom at 123 West Sixty-fourth Street with its crude rubber, export and traffic departments. Its financial office will remain at 120 Broadway.

Allis Mfg. Co., Milwaukee, manufacturer of brass and aluminum castings and parts, has increased its capitalization from \$50,000 to \$75,000 to accommodate the growth of its business and to provide for more capacity. Orin L. Hower is secretary and manager.

Racine Deflector Co. has been organized at Racine, Wis., by Michael Hammes and L. J. Borman to manufacture a headlight deflecting device invented and patented by Hammes. A factory has been established and the device is now in production.

Surplus Steel Exchange, Inc., 7 Dey Street, New York City, has opened a Chicago office at 2257 Oakdale Avenue, which is in charge of A. E. Thiffault and Raymond I. Caspers, both long affiliated with the steel trade.

Studebaker Is Not Ready to Adopt 4-Wheel Brakes

SOUTH BEND, IND., July 31—Four-wheel brakes will not be fitted to its 1924 models, the Studebaker Corp. announces. The company has spent \$200,000 and two years' time in testing out this mechanism and now states that "whenever we can develop a four-wheel braking mechanism that owner-drivers can keep adjusted and lubricated without trouble, we will put it into production. The added manufacturing cost would not exceed \$20 a car, and hence price is no obstacle. Our anxiety is that the mechanism shall be safe, simple and superior to two-wheel brakes."

The company says that four-wheel brakes work to perfection when properly adjusted and lubricated, and that driven by engineers and skilled mechanics they are safe, but it believes that in their present stage they are not safe in hands of owner-drivers.

"We do not say that four-wheel brakes cannot be made satisfactory, but do say that we have as yet been unable to develop a satisfactory design," the statement issued by the company says.

METAL MARKETS

Significantly expressive of conditions surrounding the steel market, now that August has made its bow, is the prediction generally encountered in the trade this week that it will be September before the prevailing stagnation will give way to anything resembling animation. A few weeks ago hope for a revival of some sort was pinned on August, without the least indication of demand in sight, steel sellers obviously prefer postponement of aggressive competition to the immediate tackling of the problem how to revive buying appetite, in the hope that the month just begun will bridge the gap, and force consumers to disclose their requirements somewhat more plainly than they have so far been disposed to do.

Steel producers are honestly of the opinion that all the material shipped by them on account of old orders is being absorbed by consumers as fast as it is received. This strengthens their belief that buyers must come into the market for fresh supplies before there will be any need of price cutting to bring out orders.

The statement made the other day by a prominent independent producer that the change to the eight-hour day would add \$3 to \$4.50 per ton to the cost of steel must be interpreted literally. On the basis of prevailing wage scales and manufacturing methods the cost of making steel is undoubtedly enhanced to that extent. That, however, signifies by no means that the selling price of steel must be advanced to cover this increase in costs. In fact, the statement referred to did not mention the adequacy or inadequacy of present selling prices. It is certain, however, that with costs somewhat problematical as the result of the shift from the twelve-hour to the eight-hour day, the leading steel producing interests will be more than conservative, in their attitude toward a change in selling prices. Competition by the smaller independents would have to become so keen first that downward revision would be forced upon the chief producers before such a step would even be thought of. Meanwhile, there continue deviations from quoted prices, minor in extent but sufficient to emphasize the market's softness. Black sheets have been sold at \$2 below the nominal quotation of 3.85 cents, and sheet bars are freely available at \$40, or \$2.50 below recently named levels. Intensive competition is noted for bolts and nuts.

Pig Iron.—A few melters appear to be taking advantage of the low prices at which foundry and malleable iron can be bought, but, on the whole, the market continues dull, with more and more furnaces going out of blast.

Aluminum.—Midsummer tranquillity has come over the aluminum market. Automotive consumers who a few weeks ago were interested in offerings appear to have withdrawn temporarily. If there are few buyers, however, there are also few sellers, and the outlook is that those who would pick up bargains must keep their eyes peeled. Resale lots in the Detroit and Cleveland markets may be more plentiful in the next few weeks.

Copper.—The market continues in a rut.

Tin.—Uncertainty in Anglo-French relations continues to be reflected in corresponding uncertainty in the trend of this metal.

Lead.—Recent advances were by way of correcting previous excessive reductions. The supply is light, but the demand also lacks in size. Storage battery makers are still looking on, and, when they do buy, it is rather in routine fashion.

Calendar

SHOWS

Nov. 4-10—New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.
Nov. 11-17—New York, Annual Automobile Salon, Hotel Commodore.
Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.

FOREIGN SHOWS

Sept. 28-Oct. 7—Berlin, Automobile Show.
Oct. 4-14—Paris, Passenger Cars, Bicycles, Motor-

cycles and Accessories, Grand Palais.

Oct. 15-20—London, Motorcycle Show, Olympia.

Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.

Nov. 1-15—Buenos Aires, Annual Automobile Exposition, under the direction of the Automovil Club Argentino.

Nov. 2-10—London, Automobile Show, Olympia.

Nov. 22-Dec. 1—London, Motor Transport Exhibition.

Dec. 8-19—Brussels, Passenger Cars, Trucks, Airplanes

and Motor Boats, Aviation Palace.

RACES

Sept. 3—Annual Pikes Peak Hill Climb.

Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, International Grand Prix for two liter.

CONVENTIONS

Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of

Farm Equipment Manufacturers, Hotel Statler.

Nov. 12-17—Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.

S. A. E. MEETINGS

Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.

Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

MEETINGS

Sept. 19-21—Boston, Fall Meeting of the Motor and Accessory Manufacturers Association.

Rutherford to Head Rubber Association

NEW YORK, July 30—W. O. Rutherford has been chosen president of the Rubber Association of America, to fill the vacancy caused by the death of Horace De Lisser, being moved up from the office of first vice-president. Rutherford also is president of the Motor & Accessory Manufacturers Association, this being the first time that one man has been head of these two big organizations at the same time.

There were three vacancies on the board which filled them by choosing C. B. Seger, chairman and president of the United States Rubber Co.; George E. Hall, president of the Boston Woven Hose & Rubber Co., and W. F. Pfeiffer, vice-president of the Miller Rubber Co., the last named succeeding J. W. Thomas, vice-president of the Firestone Tire & Rubber Co., which resigned its membership in the association. Seger fills the vacancy caused by the retirement of J. N. Gunn, whose connection with the United States Rubber Co. has been severed.

G. M. Stadelman, president of the Goodyear Tire & Rubber Co., has been advanced from second-vice-president of the Rubber association to fill the vice-presidency formerly held by Rutherford, while Seger has been chosen second vice-president.

French Run Small Cabs for Eight Cents a Mile

PARIS, July 30—Single-passenger taxicabs have made their appearance on the streets of Paris at hiring rates only half those of the present full size cabs. The company responsible for this venture intends to bring its cabs out at the rate of twenty-five per month until a total of 1000 is attained.

A Peugeot chassis is used with a four-cylinder engine of only 1.9 by 3.3 inches bore and stroke. This is equipped with a landaulet body for one passenger only, and makes no provision for baggage. With a track of only 36 inches and a wheelbase of 90 inches, the single-seaters doubtless will be faster in traffic than the present full size cabs. Run-

ning 45 miles to the gallon, it has been possible to reduce fares to 80 centimes for the first kilometre, 50 centimes for each additional kilometre and 6 francs per hour for waiting. At present exchange this is equivalent to about eight cents per mile.

An attempt has already been made in Paris to popularize sidecar taxis at cheap rates, but it met with no success, principally owing to the lack of protection of these vehicles and their noise.

Biggam Trailer Will Pay 5 Per Cent to Creditors

RACINE, WIS., July 30—Creditors of the defunct Biggam Trailer Co., Racine, Wis., will receive about 5 per cent. of their claims when the bankruptcy litigation is ended within a short time. It scheduled liabilities at \$20,000 and assets at \$100,000 in its petition, but so far the receiver, L. E. Pitner, has received but \$6,000 from the sale of assets, and disbursements for taxes and preferred claims amounted to \$2,000, leaving a little over \$4,000 for creditors.

The assets include notes for \$22,000, issued by H. F. Biggam, president of the concern, and value of patents owned by Biggam was given as \$20,000. It has been found that the notes are not collectible and that there is no value to the claimed patents, as letters patent have never been issued thereon.

PLANT SALE NEAR COMPLETION

CLEVELAND, Aug. 1—Ninety-eight per cent of the equipment stock which is necessary to be deposited to carry out the purchase of the Standard Equipment Co. of this city, by the Timken-Detroit Axle Co. is held by the Central National Bank Savings & Trust Co.

Under the terms of the purchase Standard Equipment stockholders are to receive 6¼ shares of Timken common for each share of Standard preferred, and three and 17/100 shares of Timken common for each share of Standard common. The book values of the companies were used as the basis for exchange of stock. The value of Standard Equipment preferred was fixed at \$100 and the common at \$50.80. That of Timken common was fixed at \$16.

Government Reports Crossing Accidents

WASHINGTON, July 27—"More careful driving" is the main reliance for the reduction of grade-crossing accidents, in the opinion of the Bureau of Labor Statistics, Department of Labor. In a statistical study of accidents in industry and on railroads the Bureau declared that the increase of grade-crossing accidents is known to be due to increased use of automobiles, together with increased traffic on the railways. It is declared "while a perfect solution of the problem can scarcely come without doing away altogether with grade crossings, great improvement may be expected with the installation of better systems of warning and the greater use of protective gates." The maximum number of deaths at such places is found in 1917. The number of injuries was slightly more in 1920 than in 1917.

It is said that the campaign of the railways warning of the danger of grade crossings should bring results in another year.

A special table, showing the number of persons and the number of trespassers killed or injured in railway accidents at highway grade-crossings in this country from 1890 to 1921, has been prepared by the Department of Labor. It indicates that accidents due to trespass have declined quite materially in recent years.

There were 1,705 persons killed and 4,868 injured during the calendar year ending December 31, 1921, a decrease as compared with the corresponding period for 1920. Deaths resulting from grade-crossing accidents reached their highest point in 1917, when 1,969 persons were killed and 4,764 injured. The records show that 131 trespassers were killed and 128 injured the same year.

DE LISSER LEFT \$1,000,000 ESTATE

NEW YORK, July 30—The will of the late Horace De Lisser, chairman of the board of directors of the Ajax Rubber Co., has been filed. It is said the estate has a probable value of \$1,000,000. It is left to the widow, Mrs. Ione De Lisser, with the exception of a few small legacies.